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THE BRITISH SPECIES OF THE GENUS *DIAPORTHE* NITS. AND ITS SEGREGATES*

By L. E. WEHMEYER

The following account of the British species of the genus *Diaporthe* is based largely upon the collections in the herbarium of E. W. Mason. I have included such collections of British species as I have examined in the course of a study of this genus and also species described from Great Britain. No extensive examination of British herbaria and collections has been made, however, and there are probably a number of other species which have been collected from this region. Grove and others have reported a number of species of *Phomopsis* which are supposed to be the pycnidial stage of various species of *Diaporthe*. Inasmuch as these are merely supposed or observational connections, such species have not been included. Nevertheless, the species here considered will probably represent the bulk of those occurring in Great Britain and will serve as a basis for the study of this genus there. Only such collections as have been actually examined are cited.

No attempt has been made to make a critical study of the conidial stages such as the species of the form-genus *Phomopsis*, etc. Such conidial stages as are recorded in the literature in connection with the species of *Diaporthe* are listed under these respective species. It should be kept in mind, however, that many of these connections are merely assumed from association with the perithecial stage. The frequent occurrence of more than one species of *Diaporthe* or *Phomopsis* on one and the same host together with the variation and difficulty of determination of species within *Phomopsis* and related form-genera make such assumptions liable to error from several sources.

The genus *Diaporthe* is here limited to those species with equally two-celled ascospores and showing blackened outlining zones within the substratum. This includes a compact related group of species, practically all members of which have a conidial stage of the *Phomopsis* type. Species with unequally two-celled ascospores are placed in the genus *Apioporthe* v. Höhn., and those with one-celled ascospores in the genus *Diaporthopsis* Fabre. The remaining species, consisting of a heterogeneous group with two-celled ascospores but no outlining zones within the substratum, are included in the genus *Cryptodiaporthe* Petrak. The species of this genus have various types of conidial stages and show relationships to various other genera, the details of which are not as yet clear.

* Paper of the Department of Botany of the University of Michigan, No. 387.

The stromata of these fungi consist of two rather distinct elements. The first to be formed is usually the *ectostroma* which consists of a conical or pulvinate mass of fungous tissue produced on the bark surface just beneath the periderm or extending somewhat into the superficial layers of the bark. The conidial hymenium, when present, is formed within locules in this tissue. The ectostroma also serves as a mechanical tissue for the rupture of the periderm on woody stems.

The *entostroma*, within which the perithecial initials arise and develop, occurs within the bark or woody tissues usually beneath the ectostroma. It consists of a more or less strongly developed proliferation of fungous mycelium within the host tissues. In some species this region is scarcely recognisable as a differentiated area, but in others it becomes definitely modified in colour and texture through the disintegration of the host tissue and the compacting of these remains by the growth of fungous hyphae. In the genus *Diaporthe*, as here recognised, these areas are more or less definitely outlined by a blackening of their periphery, as often occurs in sclerotial or other stromatic formations.

The configuration of the entostroma and the arrangement of the perithecia are various. The old terms of effuse, diatrypoid, valsoid and isolate, as applied to stromatic organisation, have never been clearly or sharply defined, and numerous transitional and variable forms exist. I have found a division into *evenly effuse*, *pustulate-effuse* and *isolate* types to be much more serviceable in the diagnosis of species.

An *effuse* stroma is one in which a number of separately erumpent perithecia or more than one group of collectively erumpent perithecia occur within the same entostromatic area.

An *effuse* stroma is considered as *evenly effuse* if there is no blackened dorsal zone, or if the dorsal blackening is limited to the surface of the bark and does not dip into this tissue. It is considered as *pustulate-effuse* if there is present a dorsal zone which dips into the bark between the perithecia or perithecial groups.

An *isolate* stroma is one which contains only one definitely orientated group of collectively erumpent perithecia. This type is not of such great value in the separation of species because many species with pustulate-effuse stromata may often produce entostromata with a single group of perithecia which are then of the isolate type.

The orientation of the perithecia into definite groups, although quite distinct and characteristic in some species, is extremely variable in others.

The custom of describing as new each occurrence upon a distinct host genus has made the separation of species upon a purely morphological basis a difficult one. Some species are definitely limited in their host range and have a correlated morphological identity. In others a given morphological species appears to occur on a wide range of hosts

with a wide range of morphological variation. The host forms in such species-complexes show a widely overlapping range of morphological characters and cannot be separated on this basis. I recognise, however, that there may exist host varieties or even species in such groups which might be separated when further comparative data, especially in regard to connected conidial stages, becomes available. For this reason such host forms, with their synonymy, are listed separately under the morphological species in question.

The following abbreviations have been used in the citation of collections:

K. Herbarium of the Royal Botanic Gardens, Kew.
M.H. Herbarium of E. W. Mason.
W.H. Herbarium of L. E. Wehmeyer.

KEY TO SEGREGATED GENERA

I. Spores one-celled. *Diaporthopsis*

II. Spores two-celled.

A. Spores unequally two-celled. *Apioporthe*

B. Spores equally two-celled.

1. Blackened zones present in the substratum (usually absent in *D. decedens* and scanty in *D. leiphaemia*). *Diaporthe*

2. Blackened zone not present in substratum. *Cryptodiaporthe*

DIAPORTHE Nits. emend.

Perithecia formed within the substratum, erumpent to the exterior through an ectostroma or directly through the overlying tissues by means of a more or less elongated perithecial neck; scattered singly, irregularly clustered or in definitely orientated groups; formed within an area of entostromatic development which shows a marginal blackening of the tissues, at least at some points. Asci clavate to cylindric with a refractive ring in the thickened apical wall, sessile, soon freed from their attachment by dissolution of the basal portion and coming to lie free within the perithecium. Paraphyses broad, band-like, present at first but disappearing at maturity. Spores elliptic-fusoid to cylindric, straight inequilateral or curved, two-celled, hyaline, sometimes appendaged and biseriate to uniseriate in the ascus.

In the following key an attempt is made to separate the species without reference to the host inhabited. As there are often overlapping forms in some groups and as the host is often a great aid in the identification of species, the host is given in parentheses after each species.

KEY TO BRITISH SPECIES OF *DIAPORTHE*

I. Entostroma evenly effuse.

A. On herbaceous stems.

1. Spores narrow, 2–2·5 (3)μ in diam., ostioles long filiform. 2, *D. Chailletii* (*Atropa*).

2. Spores broader, 2·5–4μ in diam., ostioles conical to cylindric, spine-like.

a. Entostroma sharply margined, on the surface, by a blackened line or ridge.

(I) Entostroma small, strongly developed, becoming pseudoparenchymatous, raised above the substratum and heavily blackened. 4, *D. eumorpha* (*Astragalus*, *Daucus*, *Vinca*)

(II) Entostroma not so strongly developed, varied in size, shape and surface blackening. 3, *D. pardalota*

b. Entostroma not sharply margined on the surface. 1, *D. Arctii*

B. On woody stems (many of these species grade one into the other and are often difficult to separate).

1. Spores narrow, 2–2·5 (3)μ in diam. 8, *D. pulla* (*Hedera*)

2. Spores broader, 2·5–5μ in diam.

a. Spores 9–15, never over 15μ long.

(I) Perithecia irregularly scattered or clustered, erumpent singly or in loose clusters.

(A) Spores broad, 10–12 × 3·5–5μ, two-guttulate at maturity, perithecia scattered singly. 9, *D. Hederae* (*Hedera*)

(B) Spores narrower, 9–15 × 2·5–4μ, four-guttulate at maturity, perithecia scattered singly or clustered.

(1) Ostioles short conical to cylindric, scattered. 5, *D. eres*

(2) Ostioles often elongate, filiform or sinuous, erumpent singly or in large loose clusters. 6, *D. medusaea*

(II) Perithecia usually grouped in definite clusters and erumpent as a compact disc-like fascicle of ostioles. 7, *D. spiculosa*

b. Spores 13–22μ long, usually some spores beyond the range (15μ) of the above group.

(I) Blackened zones present within the substratum.
10, *D. Sarothamni* var. *Dulcamarae* (*Solanum*)

(II) Blackened zones normally absent.
11, *D. decedens* (*Corylus*)

II. Entostroma pustulate-effuse (dorsal zone dipping into bark tissue).
A. Spores never more than 5·5μ in diam. (except in *D. varians* which has spores 4–6·5μ).
1. Entostromatic areas blackened or dark.
17, *D. syngenesia* (*Rhamnus*)
2. Entostromatic areas not blackened, usually light.
a. With a well-developed conical ectostroma through which the fascicle of ostioles is erumpent as a compact disc-like cluster.
(I) A definite obvious ventral zone within the wood.
19, *D. impulsa* (*Sorbus*)
(II) No obvious ventral zone present.
(A) Spores 11–15 × 2–3μ. 18, *D. strumella* (*Ribes*)
(B) Spores 15–20 × 2·5–5·5μ.
21, *D. leiphaemia* (*Quercus*)
b. Ectostroma not well developed, obliterated by the loose fascicle of ostioles erumpent through it.
(I) Stromata only slightly pustulate if at all.
(A) Ventral zone absent. 7, *D. spiculosa*
(B) Ventral zone present.
10, *D. Sarothamni* var. *Dulcamarae* (*Solanum*)
(II) Stromata definitely pustulate to isolate.
(A) Spores mostly 2–4μ in diam. (occasionally 5μ in *D. pustulata*).
(1) Stromata often isolate in character, often outlined on the surface by a blackened marginal line or ridge, ventral zone definite, complete. 14, *D. pustulata* (*Acer*)
(2) Stromata rarely isolate, not outlined on surface, ventral zone often incomplete.
12, *D. oncostoma* (*Robinia*)
(B) Spores 4–6·5μ in diam.
(1) Spores characteristically curved or inequilateral, ventral zone definite.
15, *D. varians* (*Acer*)
(2) Spores straight at maturity, ventral zone faint or absent.
13, *D. Crataegi* (*Crataegus*)

B. Spores 5·5μ or more in diam.
1. Spores not over 18μ long.
a. Entostromatic areas dark. 20, *D. fibrosa* (*Rhamnus*)
b. Entostromatic areas light.
16, *D. inaequalis* (*Cytisus*, *Amorpha*, *Genista*)
2. Spores 17–55μ long, always some over 18μ.
a. Spores 17–25μ long, ventral zone present.
23, *D. taleola* (*Quercus*)
b. Spores 35–55μ long, ventral zone absent.
22, *D. tessella* (*Salix*)

1. **Diaporthe Arctii** (Lasch) Nits.

Pyr. Germ. (1870), 268

Entostroma widely effuse and indefinitely outlined on surface: appearing as slightly, irregularly or heavily blackened effuse or confluent areas, or merely as numerous conical to spine-like ostioles erumpent singly or in loose groups. Surface of bark usually blackened to form a dorsal zone, but often masked by the overlying epidermis. Ostioles conic to cylindric, erumpent singly or in small groups. Ventral zone present or absent, usually present at least at the margins of the stroma. Perithecia 280–480 × 160–320μ, widely scattered or at other times crowded or tending to be clustered in small groups, usually in wood but sometimes in the bark when that tissue is well developed. Asci clavate with a refractive ring in the apex, 47–60 × 7–10μ. Spores biseriate, fusoid-ellipsoid, straight or more or less inequilateral or curved, two-celled (often tardily septate), hyaline, constricted at the septum when mature, 12–15 (17) × 2·5–4μ.

This species*, according to the writer's conception of it, has been described under a number of names and on a number of hosts. There is considerable variation in different characters on these different hosts, and on some hosts a rather characteristic appearance occurs. When one considers the entire range of variation, however, on all of the different hosts, there are no good diagnostic characters for the separation of species. The range of variation on any one host always shows a wide overlapping of the variation of other host forms. Inasmuch as some of these forms may prove to be good varieties after further study and comparison, they are listed separately with their descriptions and synonymy.

On Arctium:

Sphaeria Arctii Lasch in *Herb. Myc.* (1846), 1046.
S. immersa Fuck. *Fung. Rhen.* (1866), 1795.
Diaporthe immersa (Fuck.) Nits. *Pyr. Germ.* (1870), 274.

* For more detailed accounts of this and other species see L. E. Wehmeyer, *The genus* Diaporthe *Nit. and its segregates*.

Surface of substratum blackened over wide areas. Ostioles numerous, spine-like with conical apices, separately erumpent. Ventral zone definite, within the wood. Perithecia scattered singly in the wood. Spores straight to inequilateral, 11–15 × 2·5–3·5μ.

Hosts: *Arctium* spp.

British collections examined: Plowr. *Sphaer. Brit.* II, 34.

This is the typical form from which the species was described by Nitschke. It is common both in Europe and America.

CONIDIAL CONNECTIONS:

Phoma Arctii Sacc. in *Mich.* II (1881), 340.

Phomopsis Arctii (Sacc.) Trav. in *Fl. Ital. Crypt.* II (1906), 226.

Given as the pycnidial stage of *D. Arctii* by Saccardo, who describes the alpha conidia as 7 × 3–3·5μ and the "basidia" as 25 × 1·5μ. Obtained in ascospore culture by the writer (*Papers Mich. Acad. Sci.* VI (1927), 390). Alpha conidia 8–10 × 2–2·5μ. Beta conidia 18–25 × 1μ.

Phoma immersa Sacc. *Syll.* III (1884), 122.

Phomopsis immersa (Sacc.) v. Höhn. in *Sitz. Akad. Wiss. Wien*, CXV (1906), 680.

Given as the pycnidial stage of *D. immersa* by Saccardo. Nitschke (*Pyr. Germ.* 270) describes the "spermatia" as fusiform, 6–7 × 2–2·5μ and the "stylospores" as filiform, curved, 34 × 1μ.

On Brassica:

Diatrype coramblycola Berk. & Br. in *Ann. Mag. Nat. Hist.* ser. 5, I (1878), 29.

Diaporthe coramblycola (Berk. & Br.) Sacc. *Syll.* I (1882), 623.

Surface heavily blackened, somewhat raised above surrounding areas. Ostioles short, stout, conical, singly erumpent. Ventral zone definite. Perithecia scattered singly or crowded. Spores 11–13 × 2·5–3·5μ.

Host: *Brassica* sp.

British collections: **K**, Herb. Berk. April 17th, 1875 (type).

On Rumex:

Diaporthe maculosa Sacc. & Speg. in *Mich.* I (1878), 383.

D. Rumicis Nits. in *Grev.* VIII (1879), 107.

D. discors Sacc. in *Mich.* II (1880), 60.

D. discrepans Sacc. in *Mich.* II (1882), 568.

Dorsal blackening of bark surface showing through the epidermis as irregular blackened areas. Ventral zone present, incomplete or faint, usually just within the wood. Perithecia scattered singly. Spores often somewhat inequilateral, 12–14 × 2·5–3·5μ.

Host: *Rumex.*

British collections: Plowr. *Sphaer. Brit.* III, 41 (*D. Rumicis*).

Nitschke's *D. Rumicis* was based upon Italian specimens of Passerini but never published. It was issued in Plowright's exsiccata from King's Lynn and listed in *Grevillea.*

CONIDIAL CONNECTIONS:

Phoma Durandiana Sacc. & Roum. in *Rev. Myc.* VI (1884), 29.

P. Rumicis Auersw. in sched.

Phomopsis Durandiana (S. & R.) Died. in *Ann. Myc.* IX (1911), 24.

Phoma Durandiana was cited as the imperfect stage of *Diaporthe maculosa* by Saccardo. The conidia were given as 7–9 × 2–3μ.

On Umbelliferae:

Sphaeria inquilina Wallr. *Elench. Fung.* II (1828), 100.

S. umbellatarum Schw. *Syn. Am. Bor.* (1832), 208 (*1467).

Diaporthe inquilina (Wallr.) Nits. *Pyr. Germ.* (1870), 272.

D. Faberi Kze in *Fung. sel.* 1877, 266 (*sine diagnosi*); Sacc. *Syll.* I (1882), 649.

D. umbellatarum (Schw.) Ell. & Everh. *N. Amer. Pyr.* (1892), 739.

Surface heavily blackened or encrusted, or more or less masked by the overlying epidermis. Blackened spots limited in area or widely effuse. Marginal ridges often outlining the smaller spots or running irregularly in the larger areas. Perithecia 280–480μ in diameter, scattered singly. Ventral zones present or absent. Spores tardily septate, 9–15 × 2·5–3·5μ.

Host: *Conium Aquifolium.*

British collections: Plowr. *Sphaer. Brit.* I, 82 (*S. inquilina*). Vize, *Mic.-Fung. Brit.* 182 (*S. inquilina*).

No host is given for Plowright's collection but it appears to be on an umbelliferous host. The spores of this form on Umbellifers are tardily septate and may be confused with *Diaporthopsis Berkeleyi* which occurs on the same hosts. The spores, however, are narrower fusoid and four-guttulate rather than three-guttulate as in the *Diaporthopsis.* The surface is also more heavily blackened and the perithecia are larger and nearer the surface.

2. **Diaporthe Chailletii** Nits.

Pyr. Germ. (1870), 276

Sphaeria picea Pers. *Icon. Desc.* (1798), 40.

S. spiculosa Belladonnae Fr. *Elench. Fung.* II (1828), 75.

Forming widely effuse, irregularly blackened areas on the bark or wood surface, which are often exposed by the falling away of the periderm or bark. Ventral zone definitely present in the wood. Perithecia

320–480 × 160–320μ, scattered singly and separately erumpent as fine cylindric or somewhat elongated ostioles. Asci clavate, 40–50 × 6–7μ. Spores biseriate, ellipsoid-fusoid, two-celled, hyaline, straight, constricted at the septum, 11–12 × 2–2·5 (3)μ.

Host: *Atropa Belladonna.*

British collections: Plowr. *Sphaer. Brit.* III, 32.

This species differs from *D. Arctii* in the somewhat shorter and narrower spores and in the more elongated filiform ostioles.

3. **Diaporthe pardalota** (Mont.) Fuck.

Symb. Myc. (1869), 206

Appearing on the surface as sharply outlined entostromatic areas with a marginal blackened line or ridge where the central zone abuts upon the surface. Entostromatic areas limited in extent (1–7 mm.), confluent, or more widely effuse, margin even, or, more usually, irregularly lobed. Surface of substratum blackened heavily, only slightly, or not at all. Perithecia spherical or somewhat flattened, 160–480 × 120–300μ, scattered singly or occasionally in small groups of 2–3. Ostioles short cylindric to conical, slightly erumpent. Ventral zone definite within the wood. Asci clavate, 40–55 × 6–8μ. Spores biseriate, fusoid-ellipsoid, two-celled, hyaline, slightly constricted at the septum, straight or sometimes inequilateral or slightly curved, 9–15 × 2·5–4μ.

This species, as described above, differs from *D. Arctii* in the rather constant presence of superficial lines or ridges bounding the entostromatic areas beneath. There are some host forms which are more or less intermediate between this species and *D. Arctii*. This species also occurs on a variety of hosts, which occurrences have been described as new species in many cases. Here again the overlapping of morphological differences makes the separation of species on this basis impossible, and these variations are described as host forms.

On Cornus:

Diaporthe crassicollis Nits. *Pyr. Germ.* (1870), 258.
D. intermedia Nits. in Herb. (inedit.).
D. Corni Fuck. *Symb. Myc.* (1869), 207.
D. Brenckleana Sacc. in *Myc.* XII (1920), 202.

Entostromata somewhat limited in area or widely effuse. Margin usually irregularly lobed and sinuous. Usually where the dorsal blackening is developed just beneath the epidermis, the stromatic areas are outlined on the surface by a blackened line or ridge. When the periderm is well developed, however, this marginal line is obscured or absent. Surface of bark heavily blackened over entire area or in a spot-like manner. Ventral zone definite in wood, or only lateral.

Perithecia 240–400 × 160–240μ, scattered singly or loosely grouped. Spores 11–14 × 2·5–4μ.

Hosts: *Cornus* spp.

British collections: Vize, *Mic.-Fung. Brit.* 590.

This form on woody stems grades off into typical *D. eres*. The European collections (*D. Corni*) show the tendency towards the formation of the superficial outlining zones as in *D. pardalota*. American specimens (of *D. cornicola*), on the other hand, do not show these superficial zones and are typical of *D. eres*.

CONIDIAL CONNECTIONS:

Phoma Corni Sacc. in *Mich.* II (1880), 94.

Phomopsis Corni (Sacc.) Trav. in *Fl. Ital. Crypt.* II (1906), 268.

Fuckel cites the conidia of his *D. Corni* as cylindric-oblong, curved, 8 × 3μ. Saccardo describes the conidia as 8–10 × 2–3μ and the "basidia" as uncinate, 25 × 1μ.

On Epilobium:

Dothidea striaeformis Fuck. non Fr. in *Fung. Rhen.* (1864), 1012.

Diaporthe Epilobii Cke (non Fuck.) *Fung. Brit.* II (1879), 686. Sacc. *Syll.* I (1882), 690.

D. striaeformis Nits. in litt. in Fuck. *Symb. Myc.* (1868), 206.

On surface as elongate blackened patches. Stromata abruptly but not prominently margined, limited in area (1–3 mm.) or confluent and extending for some distance. Surface of bark heavily blackened. Ventral zone definite just within the wood. Perithecia scattered singly, erumpent as very short ostioles. Spores 11–12 × 2·5–3·5μ.

Host: *Epilobium.*

British collections: Cke, *Fung. Brit.* II, 686. Vize, *Micr.-Fung. Brit.* 591.

Saccardo gives Plowr. *Sphaer. Brit.* III, 42 as being *D. Epilobii* Cke. The copy in the Farlow Herbarium, although showing no spores, appears to be the *D. Epilobii* of Fuckel (*Didymella tosta*). Vize, *Mic.-Fung. Brit.* 591, shows only pycnidial pustules. The conidia seen were fusiform, 8–10 × 2–2·5μ.

On Euphorbia:

Diaporthe Euphorbiae Cke in *Grev.* III (1874), 67.

On surface as small (1–10 (15) × 1–3 mm.), fusoid or elliptic, blackened patches, or as more widely effuse areas. Ventral zone definite in the wood. Perithecia scattered singly. Margin of stromata sharp but not prominent. Spores 9–12 × 2·5–3·5μ.

Host: *Euphorbia amygdaloides.*

British collections: Plowr. *Sphaer. Brit.* III, 38.

CONIDIAL CONNECTIONS:

Phoma Euphorbiae Sacc. in *Mich.* II (1881), 339.

Phomopsis Euphorbiae (Sacc.) Trav. in *Fl. Ital. Crypt.* II (1906), 233.

Given by Saccardo as the conidial stage of *D. Euphorbiae*. Conidia ovoid-oblong, 7 × 3–3·5μ.

On Ilex:

Diaporthe ilicina Cke in *Grev.* XVIII (1890), 74.

Entostromatic areas rather extensive, sharply outlined but irregular in shape. Surface of bark heavily blackened only about the ostioles and appearing as blackened spots on the surface. Ventral zone within the wood. Perithecia 400–440 / 240–280μ, scattered singly or in small groups of 2–3. Spores 12–15 × 2·5–4μ.

Host: *Ilex aquifolium.*

British collections: Plowr. *Sphaer. Brit.* III, 40. Cke, *Fung. Brit.* II, 490. **M.H.** 763, Minstead, July, 1925.

Another of the forms on woody stems which differ from *D. eres* only in the presence of outlining zones on the surface, and which might better be placed under that species, as they are probably merely variations of it as is shown by the occurrence of specimens without this superficial marginal zone. The specimen in the Mason Herbarium is intermediate, showing the marginal zones only occasionally.

On Polygonatum:

Sphaeria pardalota Mont. in *Ann. Sci. nat.* sér. 2, I (1834), 304.

Diaporthe pardalota (Mont.) Nits. in litt. Fuck. *Symb. Myc.* (1869), 206.

Entostromatic areas elliptical to oblong, limited in area (2–5 (15) mm.). Surface blackened or not, margin even, sharply defined by a blackened zone. Perithecia 320–480 / 120–160μ, scattered singly. Ventral zone definite. Spores 9·6–12 / 2·5–3·5μ.

Host: *Polygonatum* (*Convallaria*) *multiflora.*

British collections: Berk. *Brit. Fung.* III, 175 (*S. pardalota*). Cke, *Fung. Brit.* II, 687.

The form which is the type of the species, with sharply outlined limited stromata.

CONIDIAL CONNECTIONS:

Phoma Convallariae West. in *Bull. Acad. Roy. Belg.* XIX (1852), (15), 50.

P. polygonatea Sacc. in *Mich.* II (1882), 617 (*Syll.* III (1884), 161).

Phomopsis Convallariae (West.) Grove in *Kew. Bull.* (1921), 138.

Grove considers *P. Convallariae* as the *Phomopsis* stage of *D. pardalota* and *P. polygonatea* as the same species. He gives the alpha conidia as

ellipsoid-fusoid, 8–9 × 1·5–2·5μ and as sometimes appearing one-septate (due to guttulae?). Saccardo describes the conidia of *P. polygonatea* as oblong, 9–10 × 3μ.

4. **Diaporthe eumorpha** (Dur. & Mont.) Maire.

Myc. Bor.-Afr. (1917), 246

Appearing upon the surface as numerous circular to elliptical or irregularly shaped, blackened, often somewhat raised areas, 0·5–5 × 0·5–1·5 mm., through the surface of which the ostioles are barely and separately erumpent. Margin of stroma even, sharp, often differentiated or ridge-like as in *D. pardalota*. Surface of stem heavily blackened. Entostroma well developed, ventral zone definite. Perithecia 200–320 × 120–240μ, scattered singly and separately erumpent. Asci clavate, 40–47 × 6–8μ. Spores biseriate, fusoid-ellipsoid, straight or slightly inequilateral, one-celled at first becoming two-celled, hyaline, finally constricted at the septum, four-guttulate, 9–15 × 2·5–4μ.

This species also occurs on a number of hosts and has been described under a number of names. It differs from *D. pardalota* in the smaller more definitely organised and more richly developed entostroma, which in some forms becomes raised above the surface in a somewhat *Diatrype*-like formation. The writer has seen it from Great Britain on only the one host below. The spore measurements given by Cooke (20–22μ) are incorrect.

On Vinca:

Sphaeria Vincae Cke in *Grev.* v (1876), 63.
Diaporthe Vincae (Cke) Sacc. *Syll.* i (1882), 656.

On surface as small heavily blackened areas, 0·2–0·5 mm. in diameter. Margin sharp and even but not differentiated. Ventral zone definite in the wood. Perithecia scattered singly, only a few in each stromatic area. Spores often inequilateral, 9–12 × 2·5–3μ.

Host: *Vinca*.

British collections: Cke, *Fung. Brit.* ii, 493. Vize, *Micr.-Fung. Brit.* 293.

5. **Diaporthe eres** Nits.

Pyr. Germ. (1870), 246

Appearing upon the surface as small pustulate ruptures or angular perforations of the periderm, often exposing the blackened surface of the bark or ectostromata. Ostioles short cylindric to somewhat elongated, erumpent singly or in small loose clusters, or occasionally in crowded masses. On twigs which are decorticated or have the periderm exfoliated, as widely effuse blackened areas with numerous erumpent ostioles. Entostroma mostly evenly effuse, usually over wide areas. Surface of bark usually blackened, dorsal blackening sometimes local,

chiefly about the erumpent ostioles, sometimes entirely lacking, rarely dipping slightly into the bark. Ventral zone present, at least at the extreme margins of the fruiting areas, usually more or less complete beneath, occasionally entirely absent. Numerous small conical or pulvinate ectostromata are formed on the bark surface causing the ruptures or perforations of the periderm. Perithecia spherical to flattened, 240–800 × 160–500μ, scattered singly, irregularly crowded, or more or less definitely grouped, separately or collectively erumpent, not definitely orientated beneath the ectostromata, but usually erumpent through them, immersed in either the bark or the wood. Asci clavate with a refractive ring in the apex, 40–60 × 5–8μ. Spores biseriate, hyaline, long narrow fusoid or often inequilateral, one-celled when young and immature, becoming broader, two-celled, fusoid, constricted at the septum, 9·5–15 × 2·5–4μ at maturity.

The forms included in the description as outlined above constitute the largest species-complex of the genus. Such forms have been described under a multitude of names on a variety of hosts, but any attempt to separate valid species on morphological grounds breaks down on account of the widely overlapping ranges of variation. One or a few specimens from a given host may present what appears to be a characteristic appearance, but an examination of larger series of specimens presents all intermediate types and when such characteristic appearances are further discounted on the basis of the effect of the host substratum, no valid criteria for separation remain. It is possible, however, that a more careful and detailed comparative study of both pycnidial and perithecial stages of these forms may indicate the presence of distinct host varieties, and host forms are therefore listed separately.

On Acer:

Diaporthe fallaciosa Nits. *Pyr. Germ.* (1870), 254.
D. protracta Nits. *Pyr. Germ.* (1870), 255.
D. Petrakiana Sacc. in *Ann. Myc.* XII (1914), 290.

Quite variable. On surface as small pustulate groups of short cylindric ostioles or as wider angular ruptures exposing the blackened bark surface. Dorsal blackening of bark surface present or absent. Ventral zone definite within wood or only at lateral margins of the fruiting areas. Ostioles short cylindric, usually erumpent in groups but sometimes singly. Perithecia thickly scattered or loosely grouped. Spores 10–14 × 2·5–4μ.

Hosts: *Acer campestris; A. Pseudo-platanus.*

British collections: Cke, *Fung. Brit.* II, 244 (*S. blepharodes*); 685 (*D. Aceris*). Plowr. *Sphaer. Brit.* III, 35 (*D. protracta*). **M.H.** (*D. protracta*) 193, Hadzor Hall, March, 1930 (parasitised by *Nectria*); 194, King Thorpe Wood, September, 1930.

On Aesculus:

Specimens of a *Phomopsis* in the Mason Herbarium appear to be *P. coneglanensis* (Sacc.) Trav., which is cited as the pycnidial stage of *Diaporthe coneglanensis* which is in turn a form of *D. eres* on *Aesculus*. A note in Mason's No. 1206 (labelled *D. coneglanensis*) gives ascospores as 12–14 × 4μ. No ascospores were found, but typical ventral zones were seen within the wood.

The pycnidial stage appears on the surface as fusoid to circular pustules often seriately arranged and erumpent through the lenticels. The pycnidial stromata were 0·5–2·5 mm. in diameter, light olive-brown to greenish black and contained irregularly chambered locules. The alpha conidia were oblong to fusoid, one-celled, hyaline, two-guttulate, 5–8·5 × 2–2·5μ. The beta conidia were filiform, straight to curved or hamate and (12) 16–25 × 0·8–1μ. The dried spore masses were olive-green.

On Conifers:

Sphaeria conorum Desm. in *Ann. sci. nat.* sér. 3, v (1846), 76.
S. strobilicola Lib. in Herb.
Valsa occulta Fuck. *Fung. Rhen.* (1863), 622.
Diaporthe occulta (Fuck.) Nits. *Pyr. Germ.* (1870), 266.
D. pitya Sacc. *Fung. Ven.* ser. 4, vii (1875).
D. conorum (Desm.) Niessl in *Hedw.* xv (1876), 2.
D. pinophylla Plowr. & Ph. in *Grev.* iv (1876), 124.
D. pinicola Hazsl. in *Math. es term. Közlem.* xxv (1892), 2, 200.
D. conigena Feltg. *Vorst. Pilz. Lux.* Nachtr. iii (1903), 136.
D. thujana Petr. in *Ann. Myc.* xix (1921), 50.

On surface as minute pustules or pustulate ruptures. Ostioles fine cylindric, sometimes elongate filiform, erumpent singly, or in small clusters. Dorsal blackening irregular or present only about the ostioles. Ventral zones definite, usually within the bark. Entostromata often limited in area. Perithecia irregularly scattered or loosely grouped. Spores 9–12 × 2·5–4μ.

Hosts: *Pinus sylvestris*, *Pseudotsuga taxifolia*, *Cedrus*.

British collections: Plowr. *Sphaer. Brit.* iii, 37 (*D. pinophylla*). **W.H.** ex Herb. G. G. Hahn (*D. pitya*) FP43976, Welshpool, Wales, September, 1926; FP43975, Lake Vyrnwy, Wales, September, 1926. **M.H.** 1132, Ham Paddock.

Occurring on a variety of conifers on twigs, cones and needles. There is a possibility of physiological forms or varieties occurring on the different conifer hosts, but so far there is no definite evidence of such a differentiation. The specimen on cedar in the Mason Herbarium is on a decorticated limb and presents a widely effuse heavily blackened surface with scattered elongated ostioles appearing like a form of

D. Arctii, but is probably merely a variation of this species. Hahn's material on *Pseudotsuga* shows many elongated ostioles.

CONIDIAL CONNECTIONS:

Phoma occulta Sacc. *Syll.* III (1884), 150.
Phomopsis occulta (Sacc.) Trav. in *Fl. Ital. Crypt.* II (1906), 221.
Sporonema strobilina Desm. in *Ann. sci. nat.* sér. 2, XVIII (1852), 368.
Plenodomus strobilinus (Desm.) v. Höhn. in *Sitz. Akad. Wiss. Wien*, CXIX (1910), 647.

The above have been given as the pycnidial stage of *Diaporthe occulta*.

Phoma conorum Sacc. in *Mich.* II (1882), 615.
Phomopsis conorum (Sacc.) Died. in *Ann. Myc.* IX (1911), 22.
P. conorum (Sacc.) v. Höhn. var. *naviculispora* Trav.
P. pitya (Sacc.) Lind pro parte, non *Phoma pitya* Sacc. Reported by Saccardo as the pycnidial stage of *Diaporthe conorum*.

The above synonymy is taken from Hahn (*Trans. Brit. Myc. Soc.* XIII (1928), 282), who gives a detailed account of this species, but reports no connection with the perithecial stage.

Phoma pitya Sacc. in *Mich.* I (1881), 126.
Sclerophoma pitya (Sacc.) Died. in *Ann. Myc.* IX (1911), 281, non *S. pitya* (Thum.) v. Höhn.
S. Magnusiana Wilson & Hahn in *Trans. Brit. Myc. Soc.* XIII (1928), 267.

Given by Saccardo as the conidial stage of *Diaporthe pitya*. The above synonymy and a detailed account of this species is given by Wilson and Hahn (*Trans. Brit. Myc. Soc.* XIII, 261), but no perithecial connection is reported.

Wilson (*Bull. Forestry Comm. Lond.* VI (1925), 11) gives *Phomopsis Pseudotsugae* Wils. (*Trans. and Proc. Bot. Soc. Edinburgh*, XXVIII (1920), 47–9) as the imperfect stage of *D. pitya*. Hahn (*in litt.*) states that he has failed to verify this and has obtained *P. occulta* from single ascospores of *D. pitya*.

Hahn (*Phytopath.* X (1920), 249) also reports a *Phomopsis juniperovora* Hahn as a parasite occurring on *Juniperus*, *Cupressus* and *Pseudotsuga* but not on *Pinus* and *Picea*.

From the above it can be seen that there is great confusion as to the species of *Phomopsis* on conifers and their perithecial connections. Hahn in a recent comparative study of these forms has reported eight distinct species (*Trans. Brit. Myc. Soc.* XV (1930), 32–93). Only one complete life history (*Diaporthe conorum—Phomopsis occulta*) is definitely established in this group, which illustrates the haphazard nature of observational connections.

On Corylus:

Diaporthe revellens Nits. *Pyr. Germ.* (1870), 302.
Sphaeria tumulata Cke & Ell. in *Grev.* v (1876), 49.
Diaporthe tumulata (Cke & Ell.) Sacc. *Syll.* i (1882), 634.
D. pusilla Sacc. in *Ann. Myc.* xii (1914), 289.

On surface as numerous pulvinate pustules with a central angular blackened disc through which the short cylindric ostioles are erumpent singly or in small clusters. Dorsal zone present or absent except about the ostiolar discs. Ventral zone within the wood. Perithecia loosely grouped or irregularly scattered. Spores 10·5–14 × 3–4μ.

Host: *Corylus Avellana.*

British collections: **M.H.** (*D. revellens*) 389, August, 1925; 390, Grabhurst, Minehead, March, 1927; 391, Llanbedr, Wales, September, 1924; 466, Mickleham, May, 1925; 467, Ashtead Downs, May, 1926; 468, Cambridge, May, 1925.

On Euonymus:

Sphaeria rostellata Lasch in Herb. Nits.

Ostioles barely and separately erumpent. Bark surface irregularly blackened. Ventral zone present. Perithecia thickly scattered. Spores 10–15 × 2·5–4μ.

Host: *Euonymus europaeus.*

British collection: Plowr. *Sphaer. Brit.* ii, 41 (*D. Laschii*).

On Fraxinus:

Sphaeria controversa Desm. in *Ann. sci. nat.* sér. 2, xvii (1842), 102.
S. ciliaris Curr. in *Journ. Micr. Soc.* vii (1859), 231.
Diaporthe scobina Nits. *Pyr. Germ.* (1870), 293.
D. Fraxini Fuck. *Fung. Rhen.* (1869), 2258.
D. controversa (Desm.) Nits. in Fuck. *Symb. Myc.* Nachtr. i (1871), 319.
D. samaricola Ph. & Plowr. in *Grev.* iii (1875), 126.
D. obscurans Sacc. *Fung. Ven.* ser. 4, vii (1875).
D. ciliaris (Curr.) Sacc. *Syll.* i (1882), 676.
D. priva Sacc. & Roum. in *Rev. Myc.* vi (1884), 27.
D. scobinoides Schulz. & Sacc. in *Rev. Myc.* vi (1884), 69.

Quite variable. On surface as numerous minute angular pustules. Bark surface often heavily blackened or sometimes free from such blackening. Ventral zones usually present, often deep in the wood. Perithecia 260–400 × 160–480μ, irregularly scattered, mostly singly, in either bark or wood. Spores 10–14 × 2·5–4μ.

Host: *Fraxinus excelsior.*

British collections: Plowr. *Sphaer. Brit.* ii, 40 (*D. scobina*); ii, 42 (*D. samaricola*, on samaras). **K**, Herb. Currey, December, 1881 (*D. ciliaris*). **M.H.** (*D. controversa*) 691 to 696, Bristol, Hadzor Hall, King-

thorpe Wood, Llanbedr, Lessness Woods, Mickleham, September to March.

CONIDIAL CONNECTIONS:

Phoma controversa Sacc. in *Mich.* II (1882), 616.
Phomopsis controversa (Sacc.) Trav. in *Fl. Ital. Crypt.* II (1906), 273.
Phoma scobina Cke in *Grev.* XIII (1885), 92.
Myxolibertella scobina (Cke) v. Höhn. in *Ann. Myc.* I (1903), 526.
Phomopsis scobina (Cke) v. Höhn. in *Sitz. Akad. Wiss. Wien*, CXV (1906), 681.

Phoma controversa was given by Saccardo as the conidial stage of *D. controversa*, with conidia fusoid 7–8×2–2·5μ and "basidia" curved, 12×1μ. Cooke cited *Phoma scobina* as the conidial stage of *D. scobina* and described the conidia as fusoid to clavate, 10–12×3–3·5μ. Von Höhnel gave the alpha conidia of his *Myxolibertella* as 8–12×1·5μ and the beta conidia as filiform, curved and 20–25×1μ. Number 697 in the Mason Herbarium contains pycnidia with fusoid, bi-guttulate alpha conidia 6–7×1·5–2·5μ and filiform hamate beta conidia 15–24×1μ. This pycnidial stage on Ash has the alpha conidia of *Phomopsis controversa* and the beta conidia of *P. scobina*.

Phomopsis pterophila (Fuck.) Died. (*Krypt. Mark. Brand.* 9, Pilze 7 (1915), 255), given as the conidial stage of *D. samaricola*, has fusoid alpha conidia which are 7–8×2·5μ and, therefore, also similar to those on Mason's specimen (see also Grove in *Kew Bull.* (1917), 61).

On Hedera:

Diaporthe Nitschkei Kze, *Fung. sel.* (1875), 124.
D. Helicis Niessl, *Notiz. Pyr.* (1876), 50.
Chorostate Helicis (Niessl) Trav. in *Fl. Ital. Crypt.* II (1906), 200.

On surface as perforations of the periderm through which one or a few short cylindric ostioles are barely erumpent. Surface of bark more or less heavily blackened and often exposed as blackened areas by the exfoliation of the periderm. Ventral zones within wood. Perithecia scattered singly or in small groups. Spores 11–14×2·5–4μ.

Host: *Hedera Helix.*

British collections: **M.H.** (*D. pulla*) 748, Minstead, August, 1925.

This form on *Hedera* is doubtfully distinct from *D. pulla* on the same host. Typical specimens of *D. pulla* have irregularly pustulate dorsal zones, more filiform ostioles and somewhat narrower spores.

On Lonicera:

Variable, on surface as barely erumpent ostioles or as small circular, blackened, ectostromatic discs or as pulvinate confluent pustules. Surface of bark irregularly blackened. Ventral zones present or absent. Perithecia large, 400–800μ in diameter, usually scattered singly or

loosely grouped in the wood, but sometimes more crowded in the bark. Spores 11–14×2·5–3·5μ.

Host: *Lonicera Periclymenum.*

British collections: **M.H.** 782.

This specimen differs from the typical occurrence on this host. The perithecia are usually buried in the wood and barely erumpent as short ostioles. Here the perithecia are clustered in the very thin bark, causing hemispherical pustulate stromata which are often confluent and appear superficially like a *Eutypella.* The entire wood tissue is stained a dark grey and the ventral zones are irregularly present. This illustrates the difference in appearance which the formation of the perithecia in the bark instead of the wood may bring about.

CONIDIAL CONNECTIONS:

Phoma cryptica Sacc. in *Mich.* I (1879), 521.

Phomopsis cryptica (Sacc.) v. Höhn. in *Sitz. Akad. Wiss. Wien,* CXV (1906), 680.

Nitschke describes the "spermatia" of his *D. cryptica* as fusiform 7–8×2μ and the "stylospores" as filiform, variously curved, 33×1μ. Such conidia were seen on this type material.

On Lycium:

Diaporthe importata Nits. *Pyr. Germ.* (1870), 315.

On surface as small ectostromata or irregular clusters of ostioles erumpent through pustulate ruptures of the periderm. Dorsal blackening present or absent. Ventral zone present or absent. Perithecia irregularly scattered, often collectively erumpent. Spores 11–14×2·5–4μ.

Host: *Lycium barbarum.*

British collections: Plowr. *Sphaer. Brit.* III, 29.

CONIDIAL CONNECTIONS:

Phoma importata Sacc. in *Mich.* II (1881), 380.

Phomopsis importata (Sacc.) Died. in *Ann. Myc.* IX (1911), 24.

Given as the conidial stage of *D. importata* by Saccardo. Alpha conidia cylindric-fusoid, 7–8×2·5–3μ and "basidia" fasciculate, acicular, 18–20×2μ.

On Phillyrea:

Diaporthe Phillyreae Cke in *Grev.* VII (1879), 81.

On surface as numerous pustulate ruptures exposing the blackened bark surface. Dorsal blackening only above the perithecia. Ventral zone deep in wood. Perithecia 320–400×240μ, scattered singly,

often erumpent in small groups. Spores rather small, straight or inequilateral, strongly constricted, 11–12 (13)×2–2·5μ.

Host: *Phillyrea.*

British collections: K, Herb. M. C. Cooke.

On Populus and Salix:

Valsa convergens Fuck. *Enum. Fung. Nass.* (1860), 24.
Diaporthe forabilis Nits. *Pyr. Germ.* (1870), 259.
D. putator Nits. *Pyr. Germ.* (1870), 306.
D. Briardiana Sacc. *Misc. Myc.* I (1884), 3.
D. simplicior Feltg. *Vorst. Pilz. Lux.* Nachtr. III (1903), 154.
D. extranea Sacc. in *Ann. Myc.* XII (1914), 289.

Variable. On surface as numerous pustulate ruptures through which the ostioles are erumpent singly or in small clusters. Ostioles sometimes slightly elongated. Surface of bark heavily or irregularly blackened. Ventral zones definite in wood. Entostromatic areas sometimes limited in area. Perithecia scattered singly or irregularly crowded, often collectively erumpent. Spores 11–15 (16)×2·5–4μ.

Host: *Populus tremula.*

British collections: Plowr. *Sphaer. Brit.* III, 30 (*D. putator*).

This form has spores which tend to be somewhat longer than the average spores of *D. eres* and in this respect is transitional to such species as *D. sociabilis.*

On Rhus:

Diaporthe Rhois Nits. *Pyr. Germ.* (1870), 315.
Valsa Rhois Cke, *Fung. Brit.* I, 245.
Gnomonia rhoina Feltg. *Vorst. Pilz. Lux.* Nachtr. II (1901), 131.
Diaporthe rhoina (Feltg.) Rehm in *Sitz. Akad. Wiss. Wien*, CXV (1906), 1250, non *D. rhoina* (Cke & Ell.) E. & E., non *D. rhoina* Feltg.

On surface as numerous pustulate blackened ruptures. Surface of bark blackened evenly or only about the barely erumpent ostioles. Ventral zone complete or sometimes merely lateral. Perithecia usually small (240–400×100–320μ), irregularly scattered. Spores 10–13·5 × 2·5–4μ.

Host: *Rhus.*

British collections: Cke, *Fung. Brit.* II, 228.

CONIDIAL CONNECTIONS:

Phoma Rhois Sacc. in *Mich.* II (1881), 340.
Phomopsis Rhois (Sacc.) Trav. in *Fl. Ital. Crypt.* II (1906), 258.

Described by Saccardo with alpha conidia oblong-cylindric 10×2–2·5μ and "basidia" filiform-hamate, 25×1μ.

On Rosa:

Diatrype incarcerata Berk. & Br. in *Ann. Mag. Nat. Hist.* ser. 3, III (1859), 364.
Diaporthe incarcerata (Berk. & Br.) Nits. *Pyr. Germ.* (1870), 297.
D. simulans Sacc. *Fung. Ven.* ser. 4 (1875), 11.
D. oligocarpoides Rehm in *Hedw.* XXVI (1887), 90.

On surface as numerous papillate swellings or circular ruptures of the periderm. Surface of bark irregularly blackened. Ventral zone definite in the wood. Perithecia usually scattered singly and singly erumpent. Spores 11–14×2·5–4μ.

Host: *Rosa* sp.

British collections: **K**, Herb. Berkeley, 1879 (*S. incarcerata*). Vize, *Mic.-Fung. Brit.* 592 (*D. incarcerata*).

CONIDIAL CONNECTIONS:

Phoma incarcerata Sacc. in *Mich.* II (1880), 95.
Phomopsis incarcerata (Sacc.) v. Höhn. in *Sitz. Akad. Wiss. Wien*, CXV (1906), 681.

Nitschke describes the "spermatia" of his *D. incarcerata* as subcylindric, 7×2μ and the "stylospores" as filiform, curved, 24–30 × 1μ.

On Symphoricarpos:

Sphaeria Ryckholtii West. in *Bull. Acad. Roy. Belg.* sér. 2 (1864), 7.
Valsa Ryckholtii (West.) Kickx, *Fl. Crypt. Flandres*, I (1867), 323.
Diaporthe Ryckholtii (West.) Nits. *Pyr. Germ.* (1870), 319.

On surface as pustulate ruptures through which one or a few short stout ostioles are erumpent. Dorsal blackening irregularly present. Often tending to dip slightly into the bark. Perithecia rather large, somewhat grouped and collectively erumpent. Ventral zone usually present. Spores 11–13×2–3μ.

Host: *Symphoricarpos racemosus.*

British collections: Plowr. *Sphaer. Brit.* III, 28.

CONIDIAL CONNECTIONS:

Phlyctaena phomatella Sacc. var. *Symphoricarpi racemosae* Sacc. in *Mich.* II (1880), 104.
Phoma Ryckholtii Sacc. *Syll.* III (1884), 70.
Phomopsis Ryckholtii (Sacc.) v. Höhn. in *Sitz. Akad. Wiss. Wien*, CXV (1906), 681.

Nitschke described the "spermatia" of his *D. Ryckholtii* as fusoid 6–8×2·5μ. Grove considers Saccardo's variety of *Phlyctaena phomatella* as pycnidia of *D. Ryckholtii* containing beta spores which are given by Saccardo as 20–22×1μ.

On Syringa:

Diaporthe resecans Nits. *Pyr. Germ.* (1870), 314.

On surface as minute blackened pustulate ruptures. Ostioles short, usually erumpent in small clusters. Surface of bark blackened about the erumpent ostioles or over the entire surface. Perithecia scattered or in small groups. Ventral zone present. Spores 11–14×2·5–4μ.

Host: *Syringa vulgaris.*

British collections: Plowr. *Sphaer. Brit.* II, 43. Cke, *Fung. Brit.* I, 492 (*Valsa Syringae*).

CONIDIAL CONNECTIONS:

Sphaeropsis depressa Lév. *Descr. Champ. d. L'Herb. Mus. Paris* (1846), 295.

Phoma resecans Sacc. in *Mich.* I (1878), 257.

P. depressa (Lév.) Sacc. in *Mich.* II (1880), 94.

Phomopsis depressa (Lév.) Trav. in *Fl. Ital. Crypt.* II (1906), 272.

Given by Saccardo as the conidial stage of *D. resecans.* Alpha conidia 10×2·5–3μ; "basidia" filiform-uncinate, 20–28×1·5μ.

On Tilia:

Sphaeria velata Pers. *Syn. Fung.* (1801), 32.

Diaporthe velata (Pers.) Nits. *Pyr. Germ.* (1870), 287.

Valsa pyreniostoma Auersw. in Herb. Nits.

Chorostate melaena Rehm in *Ann. Myc.* XI (1913), 152.

Diaporthe melaena (Rehm) Petr. *Fung. Pol.* 345 and *Myc. Carp.* (1917), 89.

D. velata f. *melaena* (Rehm) Petr. in *Hedw.* LXV (1925), 207.

Ostioles cylindric, usually erumpent in small definite clusters through small blackened pustulate ectostromata. Entostromatic areas widely extended, strongly differentiated. Dorsal blackening absent except about the ostioles or present and then often dipping slightly into the bark. Perithecia scattered, crowded or clustered, usually collectively erumpent. Ventral zone absent or present deep in the wood. Spores 11–13×2·5–3·5μ.

Hosts: *Tilia* spp.

British collections: **M.H.** 956, Shrawley Wood, Worcester, June, 1930.

This form has a well-developed entostroma and the dipping into the bark of the dorsal zone when it is present indicates the transition towards the pustulate-effuse species.

CONIDIAL CONNECTIONS:

Phoma velata Sacc. in *Mich.* II (1880), 96.

Phomopsis velata (Sacc.) v. Höhn. in *Sitz. Akad. Wiss. Wien,* CXV (1906), 681.

Nitschke gives the "spermatia" of his *D. velata* as fusoid 7–9×2μ, and the stylospores as filiform, hamate and 24–27×1μ. Saccardo describes a forma *minor* of his *P. velata* with alpha conidia 7–7·5×1·75–2μ, and "basidia" 10–14×1μ.

On Ulex:

Diatrype nucleata Curr. in *Trans. Linn. Soc. Lond.* XXII (1859), 270.
D. ligulata Nits. *Pyr. Germ.* (1870), 291.
D. nucleata (Curr.) Sacc. *Syll.* I (1882), 617.

On surface as pustulate blackened ruptures through which the sometimes elongated ostioles are erumpent singly or in small groups. Surface of bark blackened over wide areas and often exposed by loosening of the periderm. Ventral zones within the wood. Perithecia irregularly scattered. Spores 11–14×2·5–4μ.

Host: *Ulex europaeus.*

British collections: Plowr. *Sphaer. Brit.* 37. Cke, *Fung. Brit.* I, 455; II, 671. **M.H.** 976, 980, 981, Esher Common; Sugar Fen, King's Lynn; April to June: 977 to 979, 982 (Pycnidial), Ham Common; Malvern; March to June.

CONIDIAL CONNECTIONS:

Pycnidia found on Nos. 981, 982, 977 and 979 in the Mason Herbarium show pulvinate pycnidial stromata formed on the surface of the bark or wood which is heavily blackened. The stromata are white at first, becoming a greyish green and with a superficial blackened layer above. The locules are flattened and irregular. The alpha conidia are oblong to fusoid-ellipsoid, bi-guttulate, hyaline, one-celled, (5·5) 6·5–8·5×(1·5) 2–3μ. The beta conidia are slightly curved to definitely hamate, 10–21×1μ.

The pycnidia on No. 978 are of a different type, with a spherical cavity and ovoid to ellipsoid, one-celled, hyaline conidia which are smaller (2·5–3×1·5μ).

On Ulmus:

Sphaeria discutiens Berk. in Smith, *Eng. Fl.* V (1836), 245.
Diaporthe eres Nits. *Pyr. Germ.* (1870), 245.
Valsa Woolworthi Pk in *N.Y. St. Mus. Rep.* XXVIII (1876), 73.
Diaporthe Malbranchei Sacc. in *Mich.* I (1879), 509.
D. discutiens (Berk.) Sacc. *Syll.* I (1882), 677.
D. Woolworthi (Pk) Sacc. *Syll.* I (1882), 615.
D. ulmicola Ell. & Everh. in *Proc. Acad. Nat. Sci. Phil.* (1893), 141.

On surface as numerous, minute, pustulate ruptures through which the ostioles are erumpent singly or in small groups. Surface of bark more or less regularly blackened. Ventral zone present or absent.

Perithecia irregularly scattered or loosely grouped. Spores 9·5–14 × 2·5–4μ.

Host: *Ulmus campestris.*

British collections: **K**, Edinburgh, from Greville (*S. discutiens*). Plowr. *Sphaer. Brit.* II, 64 (*S. discutiens*). **M.H.** 1008, 1016 to 1027, Arundel; Ashtead; nr. Westwood Park, Worcester; Teme Valley, Worcester; April to October: 1028, 1094 to 1099, 1205 (pycnidial), Ashtead; Kew; Oscott College; Peebles; Piper's Hill Common; Richmond; September to May.

This is the typical form of this species and the type of the genus. The European specimens usually show a definite ventral zone in the wood, but this is usually lacking in American material.

CONIDIAL CONNECTIONS:

Phoma oblonga Desm. in *Ann. sci. nat.* sér. 3, XX (1853), 218.
P. eres Sacc. in *Mich.* I (1879), 521.
Phomopsis oblonga (Desm.) v. Höhn. in *Sitz. Akad. Wiss. Wien*, CXV (1906), 680.
Phoma Malbranchei Sacc. in *Mich.* I (1879), 521.

Nitschke describes the "spermatia" of *D. eres* as ellipsoid 6–7 × 3μ and the "stylospores" as filiform curved, 33 × 1μ. Cultures of *D. eres* made by me from ascospores on *Ulmus* produced *Phomopsis* pycnidia containing alpha conidia which were fusoid and 6–9 × 2–2·5μ and beta conidia which were filiform, hamate, 15–18 × 1μ. These measurements correspond to those obtained for the material of *P. oblonga* in the Mason Herbarium, the alpha conidia being (5) 6–8·5 (10) × (1·5) 2–3μ and the beta conidia 20–27 × 1μ. These beta conidia are longer than those obtained in culture, but the length of this type of spore is often quite variable. The pycnidia appear on the surface as minute pustulate ruptures caused by the small ectostromatic pycnidia formed on the bark surface. The bark surface is often blackened and the locules are usually flattened and irregular in shape. In No. 1205 the pycnidia are formed within the wood between the fibres and as a result have a quite characteristic structure, being long, fusoid, flattened stromata with a heavily blackened outer layer and a lighter coloured base, the pycnidium appearing on the surface as an isolated, fusoid, blackened spot.

Phoma oblonga is given as having elongate, elliptical alpha conidia, 6–7 × 3μ and this oblong character is typical of these conidia in Mason's material. Saccardo gave *P. eres* as having fusoid alpha conidia 10 × 3μ and beta conidia ("basidia") 15–18 × 2μ. Von Höhnel considers *P. ulmicola* Rich as a synonym of *P. eres*. *P. Malbranchei* is cited by Saccardo as the conidial stage of *D. Malbranchei*. The alpha conidia are given as ovoid-oblong, 14–15 × 5μ which suggests that it does not belong with this species.

NO HOST GIVEN:

Sphaeria quadrinucleata Curr. in *Trans. Linn. Soc. Lond.* XXII (1859), 325.
Diaporthe quadrinucleata (Curr.) Sacc. *Syll.* I (1882), 689.
Diatrype Badhami Curr. in *Trans. Linn. Soc. Lond.* XXII (1859), 270.
Diaporthe Badhami (Curr.) Sacc. *Syll.* I (1882), 635.

Although no hosts are given, the types of both these species are typical of *D. eres*. No setaceous appendages were seen on the spores of *Diatrype Badhami*, as described by Currey.

British collections: *S. quadrinucleata*: **K**, Herb. Currey, Weybridge, September, 1856; Eltham, January, 1855; from Plowright, 1873; December, 1872, on Ash. Non Plowr. *Sphaer. Brit.* I, 84.

S. Badhami: **K**, D. Badham, December, 1854; Herb. Cooke, September, 1859; non Fung. N.J. and Fung. N. Amer. No. 2595.

6. **Diaporthe medusaea** Nits.

Pyr. Germ. (1870), 251

Appearing on the surface as elongate-cylindrical or filiform sinuous ostioles which are erumpent, singly or variously aggregated in loose clusters. Bark surface in some forms heavily blackened, in others not at all blackened. Perithecia 200–500μ in diameter, irregularly scattered or tending to be in groups or crowded clusters, often forming pustulate swellings. Ventral zone present or absent. Asci clavate with a refractive ring in the apex and 40–47 × 6–9μ. Spores biseriate, hyaline, two-celled, fusoid-ellipsoid, 10–15 × 2·5–3·5μ.

Under this species are grouped a number of host forms which are characterised by the tendency of the ostioles to become elongate, filiform or often sinuous, so differing from *D. eres*. This tendency is sometimes accompanied by a heavy blackening of the bark surface and a crowding of the perithecia. Many intermediate forms exist and the elongation of the ostioles does not always occur. The species, therefore, is at times difficult to distinguish, and some specimens might easily be considered as a variety of *D. eres*. There is a rather distinct group of host forms, however, which are separated out here for convenience. So far, I have records of this species in Great Britain only from *Fagus*, though it probably occurs on other hosts.

On Fagus:

Valsa faginea Curr. in *Trans. Linn. Soc. Lond.* XXII (1859), 281.
Diaporthe macrostoma Nits. *Pyr. Germ.* (1870), 284.
D. faginea (Curr.) Sacc. *Syll.* I (1882), 619.

On surface as pustulate clusters of fine filiform sinuous ostioles. Surface of bark irregularly blackened. Ventral zone present or absent.

Perithecia usually in large crowded clusters or sometimes scattered. Spores often somewhat inequilateral, 11–14×2·5–3·5μ.

Host: *Fagus* sp.

British collections: **K**, Herb. Currey, Eltham Grove, October, 1856.

CONIDIAL CONNECTIONS:

Phomopsis Diaporthes-macrostomae (Nits.) Trav. in *Fl. Ital. Crypt.* II (1906), 280.

Nitschke describes the "spermatia" of *D. macrostoma* as fusoid, 8–9×3μ and the "stylospores" as filiform, hamate and 32–36×1μ.

7. **Diaporthe spiculosa** (Alb. & Schw.) Nits.

Pyr. Germ. (1870), 256

On surface as compact, circular pustulate discs of cylindrical ostioles which are occasionally elongate and sinuous. Stromata widely effuse. Dorsal blackening absent, or present as an evenly effuse blackening of the bark surface or as a slightly pustulate dorsal zone. Ventral zone usually absent or faint, rarely definitely present. Perithecia 200–500μ in diameter, thickly scattered or, more usually, clustered in small groups, often in slightly pustulate areas beneath small ectostromata and collectively erumpent. Asci clavate with a refractive ring in the apex, 40–47×6–9μ. Spores biseriate, ellipsoid-fusoid, two-celled, hyaline, 12–15×2·5–4μ.

This species differs from *D. eres* in the more definitely clustered perithecia, more definite ostiolar discs and the sometimes slightly pustulate dorsal zone. It is also rather difficult to separate but indicates the next step in the pustulate organisation of the stromata and the formation of definite ostiolar discs. Records of this species are also limited to one host genus.

On Sambucus:

Sphaeria spiculosa Alb. & Schw. *Consp. Fung. Nisk.* (1805), 16.
S. circumscripta Fr. in *Ann. sci. nat.* sér. 2, I (1834), 298.
Valsa circumscripta Mont. *Syll. Pl. Crypt.* (1856), 220.
V. tortuosa Fuck. *Enum. Fung. Nass.* (1860), 55.
Diaporthe spiculosa (Alb. & Schw.) Nits. *Pyr. Germ.* (1870), 256.
D. leucostroma Nits. in *Fung. Rhen.* (1867), 1989.
D. circumscripta Otth in Fuck. *Symb. Myc.* (1869), 207.
D. Robergeana f. *Sambuci* Feltg. *Vorst. Pilz. Lux.* Nachtr. II (1901), 125.

On surface as small circular pustulate discs containing a small cluster of cylindric ostioles which are sometimes elongate-sinuous. Dorsal zone absent or present and then sometimes dipping slightly into the bark. Perithecia thickly scattered, usually tending to be

clustered and collectively erumpent. Ventral zone usually absent, rarely present in the wood. Spores 10–14×2·5–4μ.

Host: *Sambucus nigra.*

British collections: Plowr. *Sphaer. Brit.* III, 39.

CONIDIAL CONNECTIONS:

Phoma sambucella Sacc. *Syll.* III (1884), 71.
Phomopsis sambucella (Sacc.) Trav. in *Fl. Ital. Crypt.* II (1906), 244.
Phoma sambucina Sacc. in *Mich.* II (1880), 97.
Phomopsis sambucina (Sacc.) Trav. in *Fl. Ital. Crypt.* II (1906), 269.

P. sambucella is given as the imperfect stage of *D. spiculosa.* The conidia are oblong-ovoid, 8×3–4μ. *P. sambucina* is regarded by Traverso as the conidial stage of *D. circumscripta.* The conidia are described as oblong fusoid, 8–10×3μ. Material in the Mason Herbarium (Nos. 946; 947 and 948) shows a *Phomopsis* on *Sambucus* causing small perforations of the bark or at times almost entirely concealed. Pycnidial stromata are formed in the bark or on the surface of the wood and the wood surface is heavily blackened forming a dorsal zone. The pycnidial cavities are rounded or flattened and irregular and contain alpha conidia which are fusoid-ellipsoid, 5·5–9·5×1·5–2·5μ. Only a few beta conidia were seen but these were filiform, slightly curved to hamate, and 16·5–25×1μ. The alpha conidia are somewhat broader than those given for the above species, but this *Phomopsis* probably belongs to *D. eres.*

8. **Diaporthe pulla** Nits.

Pyr. Germ. (1870), 249

Sphaeria spiculosa Fr. et Auct. pro parte.
S. spiculosa Fuck. *Enum. Fung. Nass.* (1860), 77.

On the surface as scattered or loosely clustered, cylindrical to sinuous filiform, shiny black ostioles, emergent through small breaks in the periderm, or, where the periderm is sloughed off, through the blackened bark surface. Entostroma irregularly pustulate-effuse, strongly differentiated. Dorsal zone irregularly pustulate, but bark tissues above entostromatic areas decaying away so that the blackened zone appears to be on the surface. Ventral zone deep in the wood or along the pith, easily overlooked. Perithecia 400–600μ in diameter, irregularly scattered or loosely clustered. Asci clavate, 35–45×5–6·5μ. Spores biseriate, narrow fusoid-ellipsoid, two-celled, hyaline, 9–13×2–2·5μ.

Host: *Hedera Helix.*

British collections: Vize, *Micr.-Fung. Brit.* 594. **M.H.** 749, Arundel, October, 1928.

This species is very similar to *D. eres* but differs in the elongate

ostioles, the narrower spores and the more pustulate dorsal zone. It is rather doubtful whether both these species exist on *Hedera* although some forms have the structure of *D. eres*; they may all be variations of *D. pulla.*

CONIDIAL CONNECTIONS:

Phoma Hederae Desm. in Fuck. *Symb. Myc.* (1869), 211.
P. pulla Sacc. in *Mich.* II (1880), 96.
Phomopsis pulla (Sacc.) Trav. in *Fl. Ital. Crypt.* II (1906), 244.

Fuckel gives *P. Hederae* as the pycnidial stage of *D. pulla.* He described the "spermatia" as oblong-lanceolate, $6\times3\mu$. Saccardo gives *P. Hederae* Fuck. non Desm. as a synonym of his *P. pulla* and describes the conidia as being $8\times2\mu$.

9. **Diaporthe Hederae** sp.nov.

Seen mostly as decorticated areas of widely effused heavily blackened areas of the wood. Visible through the bark only as scattered exposed areas of this blackening or as isolated elongate ostioles. Perithecia large, 400–750μ in diameter, scattered singly within the wood and erumpent separately as conical to short cylindric or elongate sinuous ostioles. Perithecia often causing small papillate swellings on the surface. Ventral zone present deep in the wood or as a blackening of the pith when the entire stem is entostromatic. Entostroma widely effuse, softening and discolouring the wood a yellowish white. Asci clavate to cylindric with a refractive ring in the apex, $50–60\times6–8\mu$. Spores biseriate to oblique uniseriate, broad fusoid-ellipsoid, hyaline, two-celled, constricted at the septum, at maturity, two-guttulate, $10–12{\cdot}5\times3{\cdot}5–5\mu$.

Host: *Hedera Helix.*

British collections: **M.H.** 751, Box Hill, Surrey, July, 1930.

This species is very similar in structure to *D. Sarothamni* var. *Dulcamarae* but has shorter and broader spores. The spores are similar to those of *D. Kolreuteriae* but the dorsal zone of that species is fine and pustulate effuse instead of a heavy effuse surface blackening as in this species.

A second collection (**M.H.** 750, Arundel, June, 1930) on Ivy shows a structure identical with the above species but the perithecia found in the wood contain different spores which are one-celled at first, becoming two- then four-guttulate and apparently are finally three-septate and are $14–20\times4–6\mu$. The relation of these perithecia, if any, is not clear and further material for study of this species is desirable.

Diaporthe Hederae sp.nov. Late effusa in areis valde nigricantibus decorticatis *Hederae Helicis*, in areis nondum decorticatis solum per rimas

obvia vel fortasse ostiola elongata per corticem penetrantia. Perithecia magna, 400–750μ diam. singulatim ex ligno ostiolis conicis brevicylindricis vel elongate sinuosis erumpentia. Zona ventralis profunde in ligno posita hucusque ad medullam nigricantem in caulibus totaliter entostromaticis. Entostroma late effusum, lignum disintegratum albidoluteum discolorans. Asci clavati vel cylindrici apice annulum refractivum praediti, 50–60 × 6–8μ. Sporae biseriatae vel obliquiter uniseriatae, late fusoideo-ellipsoidales, hyalinae, bicellulae, ad septum maturitate constrictae, bi-guttulatae, 10–12·5 × 3·5–5μ. Collectio typica in Herb. Univ. Mich., *E. W. Mason No.* 751, Box Hill, England.

Structura similis *D. Sarothamni* var. *Dulcamarae* sed differt sporis brevioribus latioribusque. Sporis *D. Kolreuteriae* similis sed zona dorsalis in *D. Hederae* valde effusa superficialis nec tenuis pustulato-effusa.

10. **Diaporthe Sarothamni** (Auersw.) Nits.

Pyr. Germ. (1870), 303

? *Sphaeria tetragona* Duby *Bot. gall.* II (1830), 703.
? *S. interrupta* Mont. & Fr. in *Ann. sci. nat.* sér. 2, I (1834), 295.
? *Diatrype interrupta* Mont. & Fr. *Syll. Crypt.* (1856), 218.
Valsaria Sarothamni Auersw. *in litt.* in Herb. Nits.

On surface as numerous minute, pustulate, erumpent, blackish elliptical to circular discs through which 1–3 small ostioles are barely erumpent. Entostromata evenly effuse, strongly differentiated, often somewhat limited in extent (1–5 cm.). Dorsal blackening mostly absent, when present often dipping slightly into the bark. Ventral zone present within the wood, sometimes incomplete beneath. Perithecia flattened spherical, 320–720×240–350μ, irregularly scattered or loosely grouped in bark or wood. Asci clavate 45–58 × 7–14μ. Spores biseriate, fusoid-ellipsoid, two-celled, hyaline, constricted at the septum, 13–16 (17)×3–4 (4·5)μ.

I have not seen this species from Great Britain, although it may occur; the following variety occurs.

var. **Dulcamarae** (Nits.) Wehm.

Gen. Diap. (in press).

Diaporthe Dulcamarae Nits. *Pyr. Germ.* (1870), 250.

On surface as numerous short cylindric ostioles, erumpent singly or in loose groups of 2–3. Entostromata widely effuse. Surface of bark or wood usually heavily blackened. Ventral zone deep in wood or often along the margin of the pith. Perithecia 400–600 × 300–400μ, scattered singly, usually imbedded in the wood, and often causing slight pustulate swellings. Asci clavate with refractive ring in the apex,

52–60 × 8–9μ. Spores biseriate, fusoid-ellipsoid, two-celled, hyaline, 13–15 (17) × 2·5–4 (5)μ.

Host: *Solanum Dulcamara.*

British collections: Plowr. *Sphaer. Brit.* III, 36.

D. Dulcamarae appears to be a variety of *D. Sarothamni* occurring on stems with a less well-developed bark tissue, resulting in more scattered perithecia and separately erumpent ostioles which are not definitely grouped in ectostromatic discs as in *D. Sarothamni.* The dorsal blackening is also much heavier in var. *Dulcamarae.*

CONIDIAL CONNECTIONS:

Phoma Dulcamarae Sacc. in *Mich.* II (1881), 272.
Phomopsis Dulcamarae (Sacc.) Trav. in *Fl. Ital. Crypt.* II (1906), 247.

Saccardo gives the conidia of his *Phoma* as fusoid, 8–10×2μ and the "basidia" as filiform-hamate, 25 × 1·5μ. Pycnidia in Syd. *Myc. March.* 3730 contain rod-shaped hyaline conidia, 5·5–7·5 × 1·5μ. This seems to be the *Sclerophoma solanicola* of von Höhnel (*Hedw.* LIX (1917), 242), the conidia of which are cited as cylindric and 5–7× 2–3μ.

11. **Diaporthe decedens** (Fr.) Fuck.

Symb. Myc. Nachtr. I (1871), 30

Sphaeria tessella Pers. *Syn. Fung.* (1801), 8.
S. decedens Fr. in Kze, *Myc. Hefte,* II (1823), 49.
Dialytes decedens (Fr.) Nits. in Fuck. *Fung. Rhen.* 1983.
Wuestneia tessera Auersw. in Fuck. *Fung. Rhen.* (1863), 592.
Diaporthe tessera Fuck. *Symb. Myc.* Nachtr. I (1871), 30.
Chorostate tessera (Fr.) Trav. in *Fl. Ital. Crypt.* II (1906), 209.

When young, appearing on the surface as numerous, small, circular, pustulate, ectostromatic discs, 0·2–0·4 mm. in diameter. As the perithecia mature these discs decay and fall away leaving circular perforations about which the papillate ostioles become separately erumpent through the surrounding periderm, forming scattered groups about a central disc. These ostioles may also be scattered singly as minute pustules over the surface of the twig. There is no blackened zone (normally) in either wood or bark. Perithecia spherical or flattened, 480–720×320–480μ, in loose clusters or scattered singly, but always separately erumpent. Asci clavate with a refractive ring in the apex and 68–85 × 10–15μ. Spores ellipsoid-fusoid, two-celled, hyaline, constricted at the septum, acute at the ends and variable in size. When young the spores are 13–18×3·5–4·5μ, but when fully mature they are 14–22×4–5μ. Faint hyaline appendages are sometimes present on these spores, especially when immature, but these are not a constant character.

Host: *Corylus Avellana.*

British collections: **M.H.** 394, Bristol; 393, 395, 396, 447 to 452, Ashtead, October to June.

The above collections from Ashtead are very interesting in that they show a distinct form of *D. decedens* with all intermediate gradations between it and the typical form. When first seen this form was considered to be a distinct species on *Corylus* and apparently has been described as such under the name of *Diaporthe conjuncta* (Nees) Fuck. (*Symb. Myc.* (1869), 206). Various exsiccata of *D. conjuncta* examined by the writer include some five different species of *Diaporthe* among which are several collections of *D. decedens*. The type material (Fuck. *Fung. Rhen.* (1867), 1971), however, shows pustules which are almost identical with the form here mentioned. This form of *D. decedens* is characterised by the very definitely organised pustulate stromata with definite ectostromatic discs through which the ostioles are collectively erumpent. Its identity with the typical form is concluded from the presence of all intermediate conditions in one and the same collection and even on the same twig. Where this form occurs alone on a stem, however, it appears to be quite distinct.

forma **conjuncta** (Nees) comb.nov.

Sphaeria conjuncta Nees *Syst. d. Pilze* (1817), 305.
Valsa conjuncta Nees in Fuck. *Fung. Rhen.* (1867), 1971.
Diaporthe conjuncta (Nees) Fuck. *Symb. Myc.* (1869), 206.

On surface as hemispherical to conical pustules 0·5–1·5 mm. in diameter with a central, circular to fusoid, laterally elongate, ectostromatic disc, through which a cluster of hemispherical to short cylindric ostioles are collectively erumpent. Perithecia large, 350–750×350–500μ, definitely clustered beneath a well-developed, yellowish to greyish ectostroma. No blackened zones present in the substratum. Bark surface sometimes blackened above the perithecia. Asci clavate, 58–70 × 8–10μ. Spores two-celled, hyaline, fusoid-ellipsoid, often inequilateral, with or without a slight median constriction, 2–4 guttulate, 13·5–18·5 × 4–5·5μ. No appendages seen.

In this form, *D. decedens* has the structure of a typical *Melanconis* but other specimens have been seen with a marginal blackened zone, all of which make it a variable, intermediate and puzzling species.

CONIDIAL CONNECTIONS:

In ascospore cultures, I have obtained *Phomopsis*-like stromata and two types of conidia (*Mycologia*, XIX (1927), 174). The alpha conidia were ellipsoid-fusoid to elongate-fusoid, straight, one-celled, hyaline, 11–15×2–2·5μ and the beta conidia were narrow-cylindric, hyaline, one-celled, somewhat curved or allantoid, 8–13 (15)×1–1·5 (2) μ.

This is the imperfect stage of *Diaporthe* rather than a *Melanconis*.

12. **Diaporthe oncostoma** (Duby) Fuck.

Symb. Myc. (1869), 205

Sphaeria oncostoma Duby in Rab. *Fung. Eur.* (1856), 253.
Valsa enteroleuca Curr. in *Trans. Linn. Soc. Lond.* XXII (1859), 275.
Diaporthe fasciculata Nits. *Pyr. Germ.* (1870), 247.
Valsa oncostoma (Duby) Cke, *Handb. Brit. Fung.* II (1871), 834.
V. personata Cke & Ell. in *Grev.* VII (1878), 9.
D. enteroleuca (Curr.) Sacc. *Syll.* I (1882), 612.
D. personata (C. & E.) Sacc. *Syll.* I (1882), 612.
D. dolosa Sacc. & Roum. in *Rev. Myc.* V (1883), 234.
Chorostate oncostoma (Duby) Trav. in *Fl. Ital. Crypt.* II (1906), 197.

Appearing on the surface as more or less pustulate ruptures or perforations of the periderm through which the short stout cylindric ostioles are erumpent in small loose clusters or somewhat larger irregular groups. Pycnidial ectostromata often present forming papillate pustules which are later open to the exterior. Entostroma strongly differentiated from the colour of the wood, characteristically pustulate effuse, but pustulate areas sometimes crowded, confluent and appearing somewhat evenly-effuse, usually widely extended, but sometimes limited in area and including only one or a few pustules. Dorsal zone definite, dipping into the bark between the perithecial clusters. Ventral zone usually definite and complete beneath, but often interrupted or present only at the lateral margins. Perithecia 350–600 × 350–550μ, in more or less definite clusters within the pustulate areas, occasionally irregularly scattered. Asci clavate with a refractive ring in the apex, 60–80 × 6–9μ. Spores biseriate, rather narrow fusoid-ellipsoid, two-celled hyaline, constricted at the septum, 13–17 (25) × 3–4μ.

Host: *Robinia Pseudacacia.*

British collections: Cke, *Fung. Brit.* II, 240.

This species is common on *Robinia* wherever this host is found. *Sphaeria enteroleuca* is a confused species, but Currey's conception of this species which he names *Valsa enteroleuca* is *D. oncostoma* as is shown by his description and figures. Under favourable conditions, the spores of this species may become very much elongated. A specimen in von Höhnel's Herbarium (A. 4022, May, 1916) has spores 13–20 × 2·5–4μ and material collected by me and matured in a damp chamber produced spores 16–20 (27) × 4μ.

CONIDIAL CONNECTIONS:

Phoma petiolorum Desm. in *Ann. Sci. nat.* sér. 3, VIII (1847), 16.
Sphaerocista Robiniae Preuss in *Linnaea*, XXV (1852), 734.
Phoma oncostoma Thüm. *Myc. Univ.* 877.
Cytispora abnormis B. & C. in *Grev.* II (1874), 98.

Naemospora Russelii B. & C. in *Grev.* II (1874), 157.
Cytospora orthospora B. & C. in *Grev.* II (1874), 98.
Fusicoccum Farlowianum Sacc. & Roum. *Rel. Lib.* IV (1884), 98.
Phoma Pseudacaciae Sacc. *Syll.* III (1884), 69.
Myxosporium Russelii (B. & C.) Sacc. *Syll.* III (1884), 722.
Phoma Robiniae (Pr.) Sacc. *Syll.* III (1884), 69.
Phomopsis oncostoma (Thüm.) v. Höhn. in *Sitz. Akad. Wiss. Wien*, CXV (1906), 681.
P. Pseudacaciae (Sacc.) v. Höhn. in *Sitz. Akad. Wiss. Wien*, CXV (1906), 690.
Cytospora Robiniae Schw. pro parte in Herb. (see Grove in *Kew Bull.* (1919), 178).
Phomopsis petiolorum (Desm.) Grove in *Kew Bull.* (1917), 60.

The above synonymy is taken from von Höhnel (*Sitz. Akad. Wiss. Wien*, CXXVI (1917), 394) and Grove (*Kew Bull.* (1917), 60). The "spermatia" of *D. oncostoma* are given by Fuckel as oblong-lanceolate, $10 \times 2–3\mu$. Nitschke cites them as $8–10 \times 2{\cdot}5–3\mu$ and gives the "stylospores" as filiform, curved, $20–22\ (24) \times 1\mu$. *Phomopsis*-type pycnidia, formed in ascospore cultures, contained fusoid-ellipsoid alpha conidia which were $8–10 \times 2–2{\cdot}5\mu$. Beta conidia in such pycnidia were filiform, hamate, hyaline, $13–22 \times 1–1{\cdot}5\mu$ (*Papers Mich. Acad. Sci.* III (1929), 247).

13. **Diaporthe Crataegi** (Curr.) Nits. in litt. ad Fuck.

Symb. Myc. (1869), 204

Valsa Crataegi Curr. in *Trans. Linn. Soc. Lond.* XXII (1859), 278.
Pseudovalsa (*Valsaria*) *Crataegi* Cke in *Grev.* XIV (1885), 48.
Chorostate Crataegi (Curr.) Trav. in *Fl. Ital. Crypt.* II (1906), 197.

Appearing on the surface as small pustulate ruptures of the periderm which expose a minute blackened disc, 0·2–0·8 mm. in diameter and containing the few cylindrical ostioles. Entostromata pustulate-effuse, occasionally isolated. Dorsal zone dipping between the perithecial clusters into the bark or wood. Ventral zone absent or very faint and irregular. Perithecia spherical, flattened or irregular from crowding, $240–800 \times 160–480\mu$, clustered in the differentiated pustulate areas, collectively erumpent. Very little, if any, ectostromatic development present in the mature disc. Asci clavate with a refractive ring in the apex, $67–95 \times 10–12\mu$. Spores biseriate, oblong-ellipsoid, two-celled, hyaline, constricted at the septum, often somewhat curved when young, $15–18 \times 4{\cdot}5–5{\cdot}5\mu$. Spores apparently with an outer gelatinous sheath, probably of periplasm, which makes the separation of spores in old material difficult.

Host: *Crataegus Oxyacantha.*

British collections: Cke, *Fung. Brit.* I, 380. Plowr. *Sphaer. Brit.* II, 36.

This species appears to be entirely European in its distribution, all American specimens examined being *D. eres*. It is represented in America on *Crataegus* by the related species *D. aliena*, which has shorter and broader spores and more strongly pustulate dorsal zones.

14. **Diaporthe pustulata** (Desm.) Sacc.

Syll. I (1882), 610

Sphaeria pustulata Desm. in *Ann. sci. nat.* sér. 3, VI (1846), 70.
Aglaospora pustulata (Desm.) Tul. *Sel. Fung. Carp.* II (1863), 163.
Valsaria Fraxini Hazsl. in Herb. Nits.
Diaporthe fraxinea Nits. in litt. ad Hazsl. in Herb. Nits.
D. Niesslii Sacc. (non Kze) in *Mich.* I (1871), 391.
D. Zopfii Kze in *Fung. Sel.* (1878), 264.
Calospora Zopfii (Kze) Sacc. *Syll.* II (1883), 232.
Chorostate Niesslii (Sacc.) Trav. *Fl. Ital. Crypt.* II (1906), 196.

On surface as truncate conical or angular pustules with a central blackened disc through which a small cluster of stout cylindric ostioles are erumpent. Often each pustule is surrounded by a slightly raised or blackened ridge caused by the abutting of the ventral zone upon the periderm at the margin of the entostroma. Entostromata strongly differentiated, limited in area, usually isolate in character containing a single perithecial cluster, but often with two or more pustules within a single entostromatic area. Dorsal blackening absent except on the surface of the blackened entostromatic disc. Ventral zone definite within the wood. Perithecia 250–640μ in diameter, in definite clusters, collectively erumpent. Asci clavate with a refractive ring in the apex, 67–80 × 6–8μ. Spores biseriate, fusoid-ellipsoid, two-celled, hyaline, slightly constricted at maturity, 12–15 (16) × 2–4 (5) μ.

Host: *Acer Pseudo-platanus*.

British collections: **M.H.** 187, Llanbedr, Wales, September, 1924; 188 and 192, Bristol, October, 1929; 189 (pro parte); 190, King Thorpe Wood, September, 1930; 191, Grabhurst, Minehead, March, 1927.

This is one of a group of species on *Acer* which are apparently limited to certain species of that host genus. *D. pustulata* differs from the American species (*D. acerina* and *D. dubia*) in the more isolate character of the stromata and the outlining ridge which is often visible on the surface of the substratum. *D. varians*, on *Acer campestris* in Europe, differs in the inequilateral or curved ascospores.

CONIDIAL CONNECTIONS:

Phoma pustulata Sacc. *Syll.* III (1884), 91.
Phomopsis pustulata (Sacc.) Died. in *Ann. Myc.* IX (1911), 28.

The Tulasnes (*Sel. Fung. Carp.* II (1863), 163) give the "stylospores" of their *Aglaospora pustulata* as ovoid, 10–13 × 3·5μ and the "spermatia" as 25–35μ in length. Saccardo describes the "basidia" of his *P. pustulata* as filiform, hamate, 14μ long.

15. **Diaporthe varians** (Curr.) Sacc.

Syll. I (1882), 614

Diatrype (*Valsa*) *varians* Curr. in *Trans. Linn. Soc. Lond.* XXII (1859), 270.
Dialytes Aceris Fuck. *Fung. Rhen.* (1867), 1984.
Diaporthe Aceris Fuck. *Symb. Myc.* (1869), 204.

On the surface as flattened conical pustules with a small central cluster of short, stout, barely erumpent ostioles. Entostromata isolate to pustulate-effuse in character. Dorsal zone dipping into the bark. Ventral zone definitely present in bark or wood. Perithecia 320–640 × 240–480μ, definitely clustered in the pustulate areas and collectively erumpent. Asci clavate, 60–70 × 10–12μ. Spores biseriate, fusoid-ellipsoid, usually characteristically inequilateral or curved, two-celled, hyaline, not at all or only slightly constricted at the septum, 13·5–19 × 4–6·5μ.

Host: *Acer campestris.*

British collections: **K**, Herb. Berkeley 1612 (*Sphaeria varians*).

Only two collections of this species have been seen. The spores in Berkeley's specimen are 15–19 × 5–6·5μ. Those in the second collection (Fuck. *Fung. Rhen.* 1984) are 13·5–16 × 4–5·5μ. These two specimens probably represent the range of spore size and are one and the same species.

16. **Diaporthe inaequalis** (Curr.) Nits.

Pyr. Germ. (1867), 285

Sphaeria inaequalis Curr. in *Trans. Linn. Soc. Lond.* XXII (1859), 270.
Diatrype inaequalis Berk. & Br. in *Ann. Mag. Nat. Hist.* ser. 3, III (1859), 363.
Sphaeria Fuckelii Duby in litt. in Fuck. *Fung. Rhen.* (1864), 919.
Melanconis castri-labatii Speg. *Dec. Myc. Ital.* (1879), 90.
Sphaeria neglecta Duby inedit. in Herb. Curr.
Valsa neglecta Duby in *Grev.* XIV (1885), 47.
Diaporthe neglecta (Duby) Berl. & Vogl. *Syll. Add.* (1886), 188.

Appearing on the surface as small pustulate stromata, 0·2–0·5 mm. in diameter and erumpent through the adherent periderm as small clusters of short, stout, cylindric or sometimes elongate or bent ostioles. Entostroma pustulate-effuse, dorsal zone running along or just beneath the bark surface and dipping into the bark or wood between the

perithecial groups. Perithecia flattened spherical, rather large, 450–720 × 240–500μ, scattered singly, clustered in small groups, or crowded in large clusters, usually collectively erumpent. Ventral zone absent or present as a broad brownish zone well within the wood. Asci clavate at first, becoming cylindrical at maturity, varying in size from 70–110 × 9–15μ. Spores biseriate, becoming obliquely uniseriate to uniseriate, broadly ellipsoid, hyaline, two-celled, constricted at the septum, composed of two almost isodiametric cells, each with a single large globule and measuring (12) 13–17 (18) × 5·5–9μ.

Hosts: *Cytisus* sp., *Ulex* sp.

British collections: Cke, *Fung. Brit.* 1, 372 (*Diatrype inaequalis*). **M.H.** 975, Sugar Fen, King's Lynn, June, 1930.

The broad brownish ventral zone in the wood is quite characteristic of this species. It is also found on *Genista* and *Amorpha*, on the smaller twigs of which hosts the stromata are more pustulate and the ostioles more prominent. The ventral zone is normally absent on such small twigs.

CONIDIAL CONNECTIONS:

Phoma inaequalis Speg. *Fung. Arg. Pug.* II (1880), 128.
Phomopsis inaequalis (Speg.) Trav. in *Fl. Ital. Crypt.* I (2) (1906), 259.

Nitschke gives the conidia of *D. inaequalis* as filiform, curved, 21–27 × 2μ. Spegazzini describes the conidia of his *P. inaequalis* as ellipsoid-elongate, inequilateral, 7–10 × 2–3μ. These probably represent the beta and alpha conidia respectively of this species.

17. **Diaporthe syngenesia** (Fr.) Fuck.

Symb. Myc. (1869), 204

Sphaeria Frangulae Pers. in Herb. Kew (?) Cooke.
S. syngenesia Fr. *Syst. Myc.* II (1823), 382.
Valsa syngenesia Fr. *Sym. Veg. Sc.* (1849), 411.
Diatrype Frangulae (Pers.) Cke, *Handb. Brit. Fung.* II (1871), 816.
D. syngenesia Curr. in Cke in *Seem. Journ. Bot.* IV (1866), 99.
Valsa appendiculata Auersw. in Fuck. *Fung. Rhen.* (1863), 601.
Diaporthe Berlesiana Sacc. & Roum. in *Rev. Myc.* V (1883), 234.
Chorostate syngenesia (Fr.) Trav. in *Fl. Ital. Crypt.* II (1906), 206.
C. Berlesiana (Sacc. & Roum.) Trav. in *Fl. Ital. Crypt.* II (1906), 196.

Erumpent as more or less pustulate, circular to fusoid discs, 0·5–1 mm. in diameter and composed of a compact cluster of stout cylindrical ostioles. Entostromatic areas pustulate-effuse with the dorsal zone dipping to the wood between the pustules, or with the pustulate areas more or less confluent. There is a well developed ectostromatic disc of brown hyphae and the entire entostromatic areas are filled

with a growth of these, which blacken the host tissue. No ventral zones in either the bark or wood. Perithecia 250–480 × 240–320μ, clustered within the pustulate stromatic areas. Asci clavate, 47–54 × 6–8μ. Spores biseriate, ellipsoid-oblong to fusoid-ellipsoid, two-celled, hyaline, constricted at the septum, 12–13·5 × 2–3·5 (4) μ and rarely with faint hyaline appendages, which are quickly evanescent.

Host: *Rhamnus Frangula.*

British collections: **M.H.** 888, Wicken Fen. Cambridge, August, 1930 (non Cke, *Fung. Brit.* II, 222 (*V. syngenesia*)); Plowr. *Sphaer. Brit.* II, 21 (*D. Frangulae*); Cke, *Fung. Brit.* I, 367 (*V. appendiculosa*).

When the pustulate stromata are numerous and confluent, this species is easily confused with *D. eres* on *Rhamnus* (*D. nigricolor*). It can usually be distinguished, however, by the pustulate entostromata and the definitely disc-like clusters of ostioles and the lack of a ventral zone. It differs from *D. detrusa* and *D. fibrosa* in the much narrower spores.

CONIDIAL CONNECTIONS:

Phoma syngenesia Brun. in *Act. Soc. Linn. Bord.* (1890), 57.
P. Frangulae Oud. in *Hedw.* XXXVII (1898), 314.
Fusicoccum moravicum Bub. in *Ann. Myc.* XIII (1915), 28.
Phomopsis moravica (Bub.) Petr. in *Fl. Boh. and Mor.* (1919), 1064.
P. syngenesia (Brun.) v. Höhn. in *Ber. Deut. Bot. Ges.* XXXV (1917), 255.

The connection was pointed out by von Höhnel in 1917. The above synonymy is taken from Petrak (*Hedw.* LXII (1921), 305). Bubák gives the conidia as cylindrical to oblong-cylindric, straight or curved, 6–11 × 2–3·5μ. Traverso suggests *Myxosporium Rhamni* All. as the imperfect stage of *D. syngenesia.*

18. **Diaporthe strumella** (Fr.) Fuck.

Symb. Myc. (1869), 205

Sphaeria strumella Fr. *Syst. Myc.* II (1823), 365.
S. versatilis Fr. *Syst. Myc.* II (1823), 364.
Diatrype strumella Fr. *Sum. Veg. Sc.* (1849), 385.
Sphaeria strumellaeformis de Not. *Micr. Ital. Dec.* VIII (1850), 119.
Valsa strumella (Fr.) Fuck. *Fung. Rhen.* (1863), 598.
Diaporthe mitis Sacc. in *Mich.* II (1880), 61.
D. strumellaeformis (de Not.) Sacc. *Syll.* I (1882), 614.
D. spiraeaecola Feltg. *Vorst. Pilz-Fl. Lux.* Nachtr. III (1903), 147.
Chorostate strumella (Fr.) Trav. in *Fl. Ital. Crypt.* II (1906), 199.

Visible on the surface as scattered, pustulate, circular or laterally elongated, blackened, stromatic discs, 0·5–2 × 0·2–1 mm. The flat blackened discs contain scattered papillate to conical ostioles or are

nearly obliterated by a dense fascicle of ostioles which are occasionally much elongated or bent. Perithecia spherical to ovoid, 250–400μ in diameter, definitely clustered beneath a strongly developed ectostroma. There are usually no darkened zones visible in either bark or wood. This is on account of the obscurity of the dorsal zone which runs between the bark and the wood and of the entostromatic character of the entire woody tissue, so that any ventral zone is along the margin of the pith and not noticeable. Ventral zones sometimes definitely seen deep in the wood. Asci clavate with a refractive ring in the apex and measuring 37–45 × 6–9μ. Spores biseriate, fusoid, often somewhat inequilateral or curved, two-celled, hyaline, slightly constricted at the septum at maturity, 11–15 (16) × 2–3 (3·5) μ.

Hosts: *Ribes* spp.

British collections: Berk. *Brit. Fung.* 173 (*S. strumella*). Plowr. *Sphaer. Brit.* I, 36 (*D. strumella*). Vize, *Micr.-Fung.* 157 (*D. strumella*). Cke, *Fung. Brit.* II, 670 (*D. strumella*).

This species is similar to *D. spiculosa* and *D. syngenesia* but the former species does not have the strongly pustulate nor the definite ectostromatic discs and the latter species causes a brownish discoloration of the host tissues.

CONIDIAL CONNECTIONS:

Ascospore cultures of *D. strumella* (*Mycologia*, XIX (1927), 178) have produced *Phomopsis*-like pycnidia containing one to several locules. Two types of conidia were produced on stems of *Ribes* in culture. The alpha conidia were fusoid-ellipsoid, 6–8 × 2·5μ: the beta conidia were long cylindric-fusoid, straight or slightly curved, 11–15 × 1·5μ.

19. **Diaporthe impulsa** (Cke & Pk) Sacc.

Syll. I (1882), 618

Valsa impulsa Cke & Pk *N.Y. St. Mus. Rep.* XXVII (1875), 109.
Diaporthe expatriata Rehm (?) in *Syd. Myc. March.* (1887), 1657.
D. strumelloides Rehm in Rab. *Fung. Eur.* (1890), 3753.
D. sorbicola (Nits.) Bref. *Unters. Mykol.* X (1891), 236.
D. Aucupariae Hazsl. *Sphaer. Hung.* (1892), 193.
D. Woroniniae Jacz. in *Bull. Soc. Imp. Nat. Moscou*, X (1897), 72.
D. congesta Ell. & Everh. in *Journ. Myc.* IX (1903), 165.

Appearing on the surface as pustulate conical stromata with central greyish to blackened discs, 1–1·5 mm. in diameter and containing a compact cluster of stout cylindric ostioles. Entostroma pustulate-effuse, the definite dorsal zone dipping into the bark between the perithecial clusters and bounding the lighter coloured pustulate areas. Ventral zone usually present, well within the wood. Perithecia 320–640 × 320–480μ, clustered within the pustulate areas beneath a

strongly developed, greyish, conical ectostroma, through which the ostioles are collectively erumpent. Asci clavate, 60–70 × 7–10μ. Spores biseriate, ellipsoid-fusoid, two-celled, hyaline, constricted at the septum, 13–18 × 2·5–5·5μ.

Host: *Pyrus Aucuparia.*

British collections: **M.H.** 806, King's Lynn, July, 1930.

This species is very similar to the American *D. Pruni* but differs in the shorter unappendaged ascospores. *D. Padi* differs in the lack of a well defined ectostroma and *D. pennsylvanica* in the longer ascospores. Intermediate forms between these various species are sometimes difficult to place.

CONIDIAL CONNECTIONS:

The conidial stage of this species has been obtained in culture (*Papers Mich. Acad. Sci.* IX (1929), 483). The alpha conidia are long fusoid, 15–27 × 2·5–5μ. The beta conidia are long cylindric, hamate or allantoid, 10–15 × 1–1·5μ. These conidia are very similar to, but distinctly longer than those of the related species *D. Pruni* (alpha 10–19 × 2·5–3μ; beta 10–15 × 1–1·5μ).

Bondarsew (*Not. syst. Inst. Crypt. Hort. Petropol.* I (1921), 84), has described *Phomopsis Caraganae* Bond. on *Caragana*, which has alpha conidia 13–18 × 3–3·5μ and beta conidia 14–20 × 1·5μ. This is given as the imperfect stage of *D. Woroniniae.* It may be the same as the *Phomopsis* obtained by me and merely represents an extreme of variation in the size of the conidia, but inasmuch as there is a second species, *D. Caraganae*, described on *Caragana* it would be desirable to have a further cultural comparison of these species before coming to any definite conclusions.

20. **Diaporthe fibrosa** (Pers.) Fuck.

Symb. Myc. (1869), 204

Sphaeria fibrosa Pers. *Syn. Fung.* (1801), 40.
S. extensa Fr. *Syst. Myc.* II (1823), 381.
Valsa fibrosa Fr. *Sym. Veg. Sc.* (1849), 411.
V. extensa Fr. *Sym. Veg. Sc.* (1849), 411.
Diaporthe extensa (Fr.) Sacc. *Syll.* I (1882), 618.
Chorostate fibrosa (Pers.) Trav. in *Fl. Ital. Crypt.* II (1906), 193.

Pustules variable in size, appearing on small twigs as small conical to fusoid pustules, 0·2–1 mm. in diameter with a central cluster of stout cylindric ostioles; on larger twigs forming larger fusoid to elliptic discs 1–2·5 × 0·5–0·5 mm. which rupture and throw back the periderm. The bark tissues are strongly blackened and disintegrated. Certain layers of stone cells and schlerenchyma tissue are not affected by this blackening and cause the characteristic fibrous appearance of

the infected bark. Entostromatic areas pustulate-effuse, compact, grey to black, and bounded by a dorsal zone which dips to the wood surface between the perithecial clusters, but is often difficult to distinguish on account of the blackened bark. There are no ventral zones. The perithecia are spherical to somewhat flattened, 480–720 × 320–720μ, and clustered in the pustulate areas beneath a well developed ectostroma through which the ostioles are erumpent. The asci are clavate, have a refractive ring in the apex and measure 80–95 × 8–10μ. Spores uniseriate to obliquely uniseriate, broad fusoid-ellipsoid, obtuse, two-celled, hyaline, constricted at the septum, with a single large guttula in each cell, 11–14 (16) × 6–8μ.

Host: *Rhamnus catharticus.*

British collections: Berk. *Brit. Fung.* 30 (*S. fibrosa*). Cke, *Fung. Brit.* II, 227 (*V. fibrosa*). **M.H.** 889, Bull's Bushes, Oakley, Hants, April, 1925; 890, Arundel, June, 1930.

This species is characterised by the dark coloration of the entostromata and the broad ellipsoid spores.

CONIDIAL CONNECTIONS:

Fusicoccum fibrosum Sacc. *Syll.* III (1884), 247.
Phomopsis fibrosa (Sacc.) v. Höhn. in *Sitz. Akad. Wiss. Wien*, CXV (1906), 681.

Saccardo gives the conidia of *Fusicoccum fibrosum* as ellipsoid, with an acuminate base, 11 × 5μ. A *Fusicoccum* accompanying *D. fibrosa* in Jaap's *Fung. sel.* No. 433 shows greyish ectostromata which contain fusoid to ellipsoid-oblong conidia measuring 6–11 × 2–2·5μ. A copy of Syd. *Myc. Germ.* No. 1100 in the N.Y. St. Mus., on the other hand, shows broad ellipsoid or pointed conidia, 8–13 × 3–5μ. These may represent the two types of conidia of a *Fusicoccum* or *Phomopsis*, but further cultural proof is certainly needed.

21. **Diaporthe leiphaemia** (Fr.) Sacc.

Myc. Ven. Spec. (1873), 135

Sphaeria leiphaemia Fr. *Syst. Myc.* II (1823), 399.
S. enteroleuca Fr. pro parte (?), *Syst. Myc.* II (1823), 381.
Valsa leiphaemia Fr. *Sym. Veg. Sc.* (1849), 412.
Sphaeria taleola Curr. (non Fr.) in *Trans. Linn. Soc. Lond.* XXII (1859), 276.
Cryptospora leiphaemia (Fr.) Fuck. *Symb. Myc.* (1869), 194.
C. dryophila Niessl in Rab. *Fung. Eur.* (1875), 1941.
Diaporthe dryophila (Niessl) Sacc. *Syll.* I (1882), 615.
Valsa fuscidula Cke in *Grev.* XIV (1885), 48.
Diaporthe Cerasi Feltg. (non Fuck.) *Vorst. Pilz-Fl. Lux.* Nachtr. II (1901), 124.

D. Feltgeni Sacc. & Syd. *Syll.* XVI (1902), 493.
Chorostate leiphaemia (Fr.) Trav. in *Fl. Ital. Crypt.* II (1906), 203.

First appearing upon the surface as hemispherical swellings caused by the formation, on the bark surface, of a well developed pulvinate ectostroma which soon ruptures the periderm in an angular fashion exposing an erumpent circular to angular or fusoid, orange-yellow to brownish disc which becomes cracked and roughened in age. Ostioles, for the most part, scarcely or only slightly erumpent, but sometimes strongly erumpent as stout cylindrical to conical or clavate beaks. Flattened pycnidial irregular locules may be formed on the lateral flanks of the ectostromata. The surface of the ectostroma is finally blackened and there is usually a blackened dorsal zone on the bark surface at maturity. Perithecia radially elongated, 240–480 × 320–640μ, definitely clustered beneath the ectostromatic disc and surrounded by a rich development of entostromatic mycelium which may give the stromatic area a lighter colour. Asci clavate with a refractive ring in the apex, 55–65 × 6–9μ. Spores biseriate, fusoid-ellipsoid, hyaline, two-celled, often inequilateral or slightly curved, constricted at the setpum, 15–20 × 2·5–5·5μ.

Host: *Quercus*.

British collections: **K**, Herb. Cooke, 1885, Highgate, No. 24 (*V. fuscidula*). **M.H.** 831, to 842: Ashridge, Ashtead, Bettwys-y-Coed, Bristol, Byfleet, Edinburgh, King's Lynn, Mickleham, Oxford, Richmond Park, Tintern, February to October; 873 to 876 (Pycnidial): Ashtead, King's Lynn, Richmond Park, May to September.

This species is not typical of the genus *Diaporthe*, only sometimes showing very slight dorsal blackening, and having an imperfect stage which is of the *Fusicoccum* rather than the *Phomopsis* type. It is so obviously related to other species in this group, however, that it is retained here as a somewhat atypical species.

CONIDIAL CONNECTIONS:

Cytispora leucosperma Desm. *Pl. Cr. Fr.* No. 489.
C. quercina Sacc. in *Mich.* I (1878), 261.
Fusicoccum quercinum Sacc. in *Mich.* II (1881), 345.
Cytispora quercina West. in Lamb. *Fl. Myc. Belg.* III (1880), 150.
Myxosporium lanceola Sacc. & Roum. in *Rev. Myc.* VI (1884), 36.
Phomopsis quercinum (Sacc.) v. Höhn. in *Sitz. Akad. Wiss. Wien*, CXV (1906), 681.

The imperfect stage of *D. leiphaemia* has been variously described and interpreted under the above names. Conidial locules are formed on the lateral flanks of the conical ectostromata beneath which perithecial initials may be produced. These cavities may fuse to form a single flattened arched cavity or may break open to the exterior irregularly exposing the hymenial layer. Various types of conidia and conidial

measurements have been reported for the conidia of this species. They fall, in general, however, into two groups; one cylindric, more or less curved, 6–12 × 1·5–2μ, and one fusiform, 14–22 × 3–4μ.

Conidia from the pycnidial collections in the Mason Herbarium were all of the elongate-fusoid type and measured 14–21 × 2·5–3·5μ.

Single ascospore cultures on Oak twigs received from E. W. Mason showed numerous, spherical, erumpent stromata within some of which were formed irregular conidial locules. Only the one (alpha) type of conidium was seen. This type was normally elongate-fusoid, straight or slightly curved, 14–20 × 2·5–3μ, but in some spore horns was quite variable, being often shorter fusoid, 11·5–20 × 2–3·5μ and variously curved and misshapen.

Somewhat similar cylindric-fusoid conidia, 11–20 × 2–5μ, were produced in my cultures of the variety *Raveneliana* of this species, which is the variety occurring in America. Short cylindric to somewhat allantoid beta conidia, 5·5–10 × 1·5–2μ, were also formed in these cultures.

22. **Diaporthe tessella** (Pers.) Rehm.

Rehm Asc. (1873), No. 176

Sphaeria tessella Pers. *Syn. Fung.* (1801), 48.
S. glyptica Berk. & Curr. in Herb. Berk. (1839).
Valsa tessella Fr. *Sym. Veg. Sc.* (1849), 411.
Diaporthe tessalata (Pers.) Nits. in Herb. Nits. (1864).
Hapalocystis tessella Auersw. in Herb. Nits. (1864).
Cryptospora tessella (Pers.) Karst. *Myc. Fenn.* II (1873), 79.
Valsa glyptica Berk. & Curr. in *Grev.* IV (1875), 100.
V. mucronata Pk in *N.Y. St. Mus. Rep.* XXVIII (1875), 74.
Diaporthe glyptica (Berk. & Curr.) Sacc. *Syll.* I (1882), 629.
D. mucronata (Pk) Sacc. *Syll.* I (1882), 629.
Melanconis salicina Ell. & Everh. in *Proc. Acad. Nat. Sci. Phil.* (1890), 236.
Chorostate tessella (Pers.) Trav. in *Fl. Ital. Crypt.* II (1906), 205.
Allantoporthe tessella (Pers.) Petr. in *Hedw.* LXII (1921), 289.

Visible upon the surface as clusters of separately erumpent, black, papillate ostioles, which are usually grouped about a minute perforation of the periderm which exposes a blackened ectostromatic disc, 0·2–0·4 mm. in diameter. When the periderm is thin and transparent, as it often is, the blackened zone in the bark appears on the surface as a black line outlining clusters of ostioles, irregular in shape and 1–3 mm. in diameter. The entostromatic areas in the bark are either isolated or confluent forming a pustulate-effuse stroma. The perithecia are irregularly spherical, 400–725μ in diameter, and occur singly or in groups of 2–8 within pustulate stromatic areas 1–4 mm. in diameter. There is no blackening of the bark surface within these

areas but a sharp black zone extends from the margins into the bark tissue. When the entostromata are isolated, this dark zone continues along the lower bark surface between the stromata, but when the stromata are confluent, it dips only slightly into the middle or upper portion of the bark. There is no ventral zone within the wood. The perithecia are separately erumpent through the periderm, usually about a central cushion of ectostromatic tissue. Asci clavate with a refractive ring in the apex, 110–145 × 18–21μ. The spores are cylindric-fusoid, usually curved or bent at the septum, two-celled, hyaline, constricted at the septum, 35–55 × 7–9μ and often possess a faint hyaline appendage at each end.

Host: *Salix* sp.

British collections: **K**, Berkeley Herb., four packets from King's Cliffe, 1839; one from Apethorpe, 1833 (*S. glyptica*).

Petrak (*Hedw.* LXII (1921), 289) placed this species in a new genus *Allantoporthe* on account of the large allantoid spores and the lack of a *Phomopsis* stage. The spores are not allantoid, and are no larger than those of other species of *Diaporthe*. Ascospore cultures of this species have given a *Phomopsis*-like imperfect stage (*Papers Mich. Acad. Sci.* VIII (1928), 224) which had only one type of conidium, however, which were curved-fusoid to allantoid, one-celled, hyaline, 5·5–9 × 1–1·5μ.

23. **Diaporthe taleola** (Fr.) Sacc.

Fung. Ven. IV (1875), 12

Sphaeria taleola Fr. *Syst. Myc.* II (1823), 391.
Valsa taleola Fr. *Sym. Veg. Sc.* (1849), 411.
Aglaospora taleola (Fr.) Tul. *Sel. Fung. Carp.* II (1863), 168.
Hercospora Karnhuberi Keumler in Herb. von Höhnel (1887).
Diaporthe nigro-cincta Pass. in *Brun. Nuov. Fragm. Myc.* (1885–6), 27.
Caudospora taleola (Fr.) Star. in *Bih. t. K. Svenska Vet.-Akad.-Handl.* 15, III (1889), 11.
Melanconis taleola (Fr.) Speg. in *Rev. Myc.* II (1880), 32.
Chorostate taleola (Fr.) Trav. in *Fl. Ital. Crypt.* II (1906), 212.

Appearing on the surface as small conical pustules with a closely adherent periderm and a central, circular to fusoid, whitish or blackened disc, 0·2–1 mm. in diameter. Sometimes with stout, hemispherical, erumpent ostioles. Entostromata isolate, definitely outlined beneath by a sharp ventral zone entirely within the bark; no dorsal zone. The line along which the ventral zone abuts upon the periderm often appears upon the surface as a marginal ridge about the pustule. Perithecia mostly somewhat radially elongated, 240–400 × 320–400μ, arranged in a definite cluster within the isolate entostromatic area and beneath a definite, white, conical to pulvinate ectostroma. Ostioles

collectively erumpent through this ectostroma. Asci long-cylindric with a stipe-like base and a refractive ring in the apex, usually 8- but sometimes 4-spored, 130–160 × 10–13μ. Spores uniseriate, broad ellipsoid, two-celled, hyaline, constricted at the septum, with cylindrical, hyaline, apical appendages, 6–10 × 1–1·5μ, and 2–3 lateral, somewhat longer appendages radiating from the region of the septum. Spores 17–25 × 7–9·5μ.

Host: *Quercus.*

British collections: Plowr. *Sphaer. Brit.* II, 37. Cke, *Fung. Brit.* II, 231 (*V. taleola*). **M.H.** 843 to 849: Arundel, Kew, Oscott College, Richmond Park and Old Deer Park, Sheen Common, January to October.

This is quite a distinct species which has been placed in a separate genus, *Caudospora* ,by Starback, on account of the peculiar appendages. It is a typical *Diaporthe*, however, and many other species of the genus have appendaged spores. The multiplication of genera on slight distinctions only causes confusion. The appendages on the spores soon disappear and are often lacking in older spores.

CONIDIAL CONNECTIONS:

Libertella taleola Sacc. *Syll.* III (1884), 745.
Myxosporium taleola Sacc. *Syll.* III (1884), 726.

The Tulasnes describe "stylospores" of *Aglaospora taleola* as linear, cylindrical, curved and 20–30 × 4μ. They also mention globular conidia, 3·5μ in diameter, which form agglutinate masses. Fuckel (*Symb. Nachtr.* I (1871), 312) found similar stylospores 24 × 4–5μ and also straight elliptic "leucoconidia" 16 × 8μ, but no spherical conidia. Tubeuf (*Diseases of Plants*, p. 226, Eng. ed.) figures similar sickle-shaped conidia and Currey (*Phil. Trans. Roy. Soc. Lond.* CXLVII (1857), 550) reports and figures straight to strongly curved spores. Fuckel gives the locules as being labyrinthiform and in the apex of the ectostroma and they are similarly figured by Tubeuf. All of the conidia are one-celled.

CRYPTODIAPORTHE Petrak emend.

Ann. Myc. XIX (1921), 118

Perithecia immersed in the bark, more or less irregularly scattered or in definite clusters but usually with convergent ostiolar necks which are erumpent through the periderm or through a variously formed ectostroma. Ectostroma scantily developed or as a definite conical to pulvinate erumpent disc, or as a loose weft of hyphae causing a broad angular rupture of the periderm. Entostroma very scanty or as a rich development of hyphae about the perithecia often forming a definitely orientated stroma. No blackened marginal zones within the substratum. Asci clavate, often with a refractive ring in the apex and

with a tapering base which is evanescent freeing the asci within the perithecium. Spores hyaline, equally two-celled, ellipsoid to fusoid, straight or curved and often appendaged. Conidial stages various.

The genus *Cryptodiaporthe* was erected by Petrak to include those species of *Diaporthe* with a weak entostromatic development and no blackened zones within the substratum. The genus is here extended to include all forms without blackened zones in the substratum and equally two-celled spores.

KEY TO THE BRITISH SPECIES OF *CRYPTODIAPORTHE*

I. Spores 4μ or less in diameter.
  A. Ostioles erumpent singly or in loose groups of 2–4 without a well-developed ectostroma.
    1. Spores 9–11μ long. 1, *C. Lebiseyi* (*Acer*)
    2. Spores 13–22μ long. 2, *C. salicella* (*Salix, Populus*)
  B. Ostioles erumpent in definite groups through a pustulate ectostroma.
    1. Spores 15–20μ long, ostioles usually flattened, band-like. 5, *C. hystrix* (*Acer*)
    2. Spores 11–16μ long, ostioles cylindric.
      a. Ostioles not strongly erumpent, spores usually appendaged. 4, *C. castanea* (*Castanea*)
      b. Ostioles stout, strongly erumpent, spores not appendaged. 8, *C. hranicensis* (*Tilia*)

II. Spores more than 4μ in diameter.
  A. Ostioles erumpent singly or in small loose groups through irregular breaks in the periderm. 3, *C. salicina* (*Salix, Populus*)
  B. Ostioles erumpent collectively through a definite disc.
    1. Ostioles erumpent through a small conical whitish ectostroma, forming a definite disc. 7, *C. Aesculi* (*Aesculus*)
    2. Ostioles loosely erumpent through a widely erumpent, brownish cortical disc. 6, *C. pyrrhocystis* (*Corylus*)

1. **Cryptodiaporthe Lebiseyi** (Desm.) Wehm.

Sphaeria Lebiseyi Desm. in *Ann. sci. nat.* sér. 2, xv (1841), 144.
S. blepharodes Berk. & Br. in *Ann. Mag. Nat. Hist.* ser. 3, vii (1861), 454.
Diaporthe Lebiseyi (Desm.) Niessl, *Beitr.* (1872), 54.
D. blepharodes (Berk. & Br.) Sacc. *Syll.* i (1882), 678.
D. hystricula Sacc. & Speg. in *Mich.* i (1879), 392.

Gnomonia Aceris Feltg. *Vorst. Pilz-Fl. Lux.* Nachtr. III (1903), 157.
Chorostate hystricula (Sacc. & Speg.) Trav. in *Fl. Ital. Crypt.* II (1906), 211.

Appearing on the surface as numerous, minute, conical or elongate pustulate ruptures of the periderm, through which the minute, fine filiform ostioles (30–40μ in diameter) are more or less erumpent, singly or in small clusters of 2–4. Perithecia spherical or somewhat flattened, 200–350μ in diameter, scattered singly or in loose clusters within the bark cortex, singly erumpent or with the ostioles convergent and collectively erumpent. There are no blackened zones within the bark or wood. Asci clavate, 30–45 × 4–8μ. Spores biseriate, narrow-fusoid, hyaline, often one-celled at first, becoming two-celled, sometimes inequilateral (?), 9–11 × 2–2·5μ.

Host: *Acer Pseudo-platanus*.

British collections: **K** (sheet 2372), Herb. Berk., 1879. Cke, *Fung. Brit.* II, 244 (*S. blepharodes*).

This is a very confused species which seems to be a European form of *C. densissima* var. *spicata*, from which it differs in the smaller spores and less elongated ostioles. If it is a distinct species, it is easily confused with the immature condition of *D. eres*, from which it differs in the smaller spores and the lack of any blackening of the substratum. It is also easily confused with *C. Niesslii*, which is also difficult to delimit.

CONIDIAL CONNECTIONS:

Phoma Lebiseyi Sacc. in *Mich.* I (1878), 257.
Phomopsis Lebiseyi (Sacc.) Died. in *Ann. Myc.* IX (1911), 25.

Saccardo gives the conidia of this species as fusoid, 8–10 × 3μ.

2. **Cryptodiaporthe salicella** (Fr.) Wehm. non Petrak.

Sphaeria salicella Fr. *Syst. Myc.* II (1823), 377.
Valsaria decipiens Auersw. in Herb. Nits. (1863).
Diaporthe spina Fuck. *Symb. Myc.* (1869), 210.
D. spina var. *apiculata* (Wint.) Rehm in *Ann. Myc.* VII (1909), 404.
Cryptodiaporthe populina Petr. in *Ann. Myc.* XIX (1921), 117.
C. apiculata (Wallr.) Petr. in *Ann. Myc.* XIX (1921), 177.

Visible on the surface as numerous, minute, papillate swellings of the periderm which are soon ruptured by the separately erumpent, fine conical to cylindric ostioles. Perithecia small, 280–400μ in diameter, spherical, with membranous walls, scattered singly or in small loose clusters of 3–4. There is no stromatic development about the perithecia, but there is sometimes a slight greyish ectostromatic cushion through which the ostioles are erumpent. There are no blackened zones in either the bark or the wood. Asci clavate, often

stipitate, with a refractive ring in the apex, 25–50 × 9–12μ. Spores biseriate or obliquely uniseriate, cylindrical-fusoid, acute at the ends, two-celled, hyaline, scarcely or not at all constricted at the septum, straight or sometimes curved, 15–22 × 2–2·5 (3)μ. (When young, the spores may be shorter fusoid, 13–18 × 2–2·5μ.)

Host: *Salix* sp.

British collections: Plowr. *Sphaer. Brit.* II, 67 (*S. salicella*); II, 44 (*D. spina*). Non Cke, *Fung. Brit.* II, 243 and 246 (*S. salicella*).

This species might easily be considered as a *Gnomonia*, but often shows clustered perithecia and sometimes produces small ectostromata through which the ostioles are erumpent. It is very similar to *C. salicina* in outward appearance but has more scattered perithecia, thinner ostioles and narrower fusoid spores. Contrary to most of the exsiccata issued, *Sphaeria salicella* Fr. appears to be this species (see discussion under *C. salicina*).

CONIDIAL CONNECTIONS:

Cryptosporium coronatum Fuck. *Symb. Myc.* (1869), 193.
Discella coronata (Fuck.) Petr. in *Ann. Myc.* XIX (1921), 180.

Petrak gives the above as the imperfect stage of *C. populina*. The conidia are described as cylindric to spindle-form, straight or slightly curved, with an indefinite cross wall, and 15–24 × 2·5–5μ. These conidia are strikingly similar to those I obtained in cultures of *C. salicina*

3. **Cryptodiaporthe salicina** (Curr.) Wehm.

(?) *Sphaeria apiculata* Wallr. *F. Crypt. Germ.* II (1833), 778.
(?) *S. convexa* Preuss *Fung. Hoyersw.* (1852), 300.
Halonia salicella Rab. *Fung. Eur.* (1850), No. 1445.
Sphaeria salicina Curr. in *Trans. Linn. Soc. Lond.* XXII (1859), 157.
Diaporthe Salicis Nits. in Fuck. *Fung. Rhen.* (1867), 1987.
Sphaeria apiculata Fuck. *Symb. Myc.* (1869), 115.
Cryptospora populina Fuck. *Symb. Myc.* (1869), 193.
C. salicella Fuck. *Symb. Myc.* (1869), 193.
Diaporthe salicella Sacc. *Myc. Ven. Spec.* (1873), 135.
Sphaeria sphingiophora Oud. in *M. M. Neer.* II (1873), 64.
Cryptosporella populina (Fuck.) Sacc. in *Mich.* I (1879), 506.
Diaporthe convexa (Preuss) Sacc. *Syll.* I (1882), 630.
D. sphingiophora (Oud.) Sacc. *Syll.* I (1882), 622.
Metasphaeria apiculata (Fuck.) Sacc. *Syll.* II (1883), 166.
Diaporthe pulchella Sacc. & Briard in *Att. d. R. Inst. Ven. di Sci.* ser. 4, II (1884), 3.
D. santonensis Sacc. *Fung. Gall.* ser. 5 (1884), No. 2163.
Valsa punctata Cke in *Grev.* XIV (1885), 47.

Diaporthe punctata (Cke) Berl. & Vogl. *Syll. Add.* (1886), 108.
Gnomonia apiculata (Fuck.) Wint. in Rab. *Krypt. Fl.* I, II (1886), 589.
Diaporthe populea Sacc. in *Bull. Soc. Roy. Belg.* XXVI (1887), 174.
Gnomonia salicella Schröt. *Pilze Schles.* 3, II (1897), 392.
Diaporthe cupulata Berl. & Destr. *Suppl. Cat. Champ. Haye* (1897), 7.
D. salicella var. *Populi-tremulae* Feltg. *Vorst. Pilz-Fl. Lux.* Nachtr. IV (1905), 87.
Chorostate salicella Trav. in *Fl. Ital. Crypt.* II (1906), 203.
C. populea (Sacc.) Trav. in *Fl. Ital. Crypt.* II (1906), 204.
Diaporthe recedens Sacc. in *Ann. Myc.* XII (1914), 290.
D. populina (Fuck.) v. Höhn. in *Ann. Myc.* XVI (1918), 106.
Cryptodiaporthe salicella Petr. in *Ann. Myc.* XIX (1921), 182.

Visible on the surface as numerous, minute, conical pustules consisting of one or more ostioles surrounded by the closely adherent and pustulate periderm. The ostioles are usually separately erumpent but are often in clusters of 2–8, which sometimes become fused to form a small disc. Perithecia spherical or somewhat flattened, 300–480 × 380–400μ, walls membranous, 18–27μ in thickness, composed of 4–5 layers of dark-walled pseudoparenchyma cells. The perithecia are scattered singly or in small loose groups within the bark cortex. There is often a slight pulvinate ectostroma formed on the bark surface, but this ectostroma is usually obliterated by the ostioles which are erumpent through it. There are no blackened zones within the substratum. Asci clavate, 45–70 × 9–15μ. Spores biseriate, ellipsoid to inequilateral, blunt at the ends. Two-celled but often tardily septate, hyaline, not constricted at the septum, 15–20 × (3·5) 4·5–7·5μ.

Hosts: *Salix* and *Populus* spp.

British collections: Cke, *Fung. Brit.* II, 246. Vize, *Micr.-Fung. Brit.* 180 (*S. salicella*). **K**, Herb. Cooke, No. 210 (four packets) (*V. punctata*). **M.H.** 920, Tintern, April, 1924 (*Didymella Salicis*); 1215, Glamorganshire, April, 1932 (*D. salicella*).

This species has also been placed under *Gnomonia*, but the grouping of the perithecia and the formation of ectostromatic discs would exclude it from this genus. The synonyms and exsiccata of this and the preceding species are greatly confused. This species has generally been considered as the *Sphaeria salicella* of Fries, but an examination of Fries's material (*Scler. Suec.* 188), as represented in the Farlow Herbarium, shows the spores of the preceding species and the name *salicella* is, therefore, retained for that species. Desmazières (*Pl. Cr. Fr.* (1836), 838) states that in some issues of Fries's *Scler. Suec.* 188 there are two distinct species, and it is possible that his exsiccatum is a mixture of these two species. The first name that can be definitely fixed to the above species is that of *Sphaeria salicina* Curr.

CONIDIAL CONNECTIONS:

Phacidium carbonaceum Fr. *Syst. Myc.* II (1823), 574.
Discella carbonacea (Fr.) Berk. & Br. in *Ann. Mag. Nat. Hist.* ser. 2, V (1850), 377.

The above species is supposed by Petrak (*Ann. Myc.* XIX (1921), 192) to belong to his *Cryptodiaporthe salicella* merely by association. My cultures of this species have produced minute ectostromatic pycnidia with enclosed spherical locules containing long, cylindric to fusoid conidia, straight or somewhat curved, 15–22 × 1·8–2·5μ. These conidia were usually one-celled, but sometimes became septate when fully mature.

4. **Cryptodiaporthe castanea** (Tul.) Wehm.

Sphaeria castanea Tul. in *Ann. sci. nat.* sér. 3, XV (1851), 379.
Valsa castanea Tul. in *Ann. sci. nat.* sér. 4, V (1856), 117.
Cryptospora liphaemoides Fuck. *Symb. Myc.* Nachtr. II (1873), 34.
Diaporthe castanea (Tul.) Sacc. *Syll.* I (1882), 624.
D. liphaemoides (Fuck.) Trav. in *Fl. Ital. Crypt.* II (1906), 207.
Chorostate castanea (Tul.) Trav. in *Fl. Ital. Crypt.* II (1906), 207.

Appearing on the surface as angular ruptures of the periderm exposing brownish ectostromatic or cortical discs of variable size and form, from 0·2–2 mm. in diameter. Conical to broad pulvinate ectostromata are usually formed on the bark surface, often causing wide ruptures of the periderm but soon becoming blackened or falling away. There are no blackened zones within the substratum. Irregularly shaped conidial locules may be formed, usually within the lateral portions of the ectostroma. Perithecia spherical to flattened, 240–800 × 200–500μ, clustered in small or larger groups within the upper bark and often surrounded by a rich development of entostromatic hyphae, forming a light coloured area. Ostioles barely erumpent through the ectostroma or bark surface. Asci 50–60 × 7–8μ clavate. Spores biseriate, cylindrical to cylindric fusoid, two-celled, hyaline, often tapering toward one end, usually somewhat curved, very slightly or not constricted, 11–16 × 2–3μ, and usually having a short, cylindric, hyaline appendage at each end.

Host: *Castanea* sp.

British collections: **M.H.** 446, Arundel, October, 1928.

Similar to *C. Hystrix* in the rather widely erumpent stroma but differing in the small spores and lack of flattening of the ostioles.

CONIDIAL CONNECTIONS:

Cytispora castanea Sacc. in *Mich.* I (1879), 519.
Fusicoccum castaneum Sacc. *Syll.* III (1884), 249.
Malacostroma castaneum (Sacc.) v. Höhn. in *Ber. Deut. Bot. Ges.* XXXV (1917), 355.

The Tulasnes (*Sel. Fung. Carp.* II (1863), 202) describe the conidia of this species as sublanceolate, 6·5 × 2μ, and figure irregularly shaped locules, usually in the lateral portions of an ectostroma. Saccardo gives the conida as 6·5–8, sometimes 10–12 × 2–2·5μ. Fuckel says the conidia of his *Cryptospora liphaemoides* are 6–10 × 2–4μ, but his *Fung. Rhen.* 2453 shows small elliptical conidia 4–6 × 1·5–2μ.

5. **Cryptodiaporthe hystrix** (Tode) Petr.

Ann. Myc. XIX (1921), 119

Sphaeria hystrix Tode (?) *Fung. Meckl. Sel.* II (1791), 53.
Diatrype hystrix Fr. (?) *Sym. Veg. Sc.* (1849), 383.
Mamiana hystrix (Tode) de Not. *Sfer. Ital.* I (1863), 43.
Valsa longirostris Tul. *Sel. Fung. Carp.* II (1863), 200.
Cryptospora hystrix (Tode) Fuck. *Symb. Myc.* (1869), 194.
Diaporthe hystrix (Tode) Sacc. *Fung. Ven.* IV (1873), 6.
D. longirostris (Tul.) Sacc. *Syll.* I (1882), 609.
D. mamiana Sacc. *Syll.* I (1882), 609.
Chorostate hystrix (Tode) Trav. in *Fl. Ital. Crypt.* II (1906), 212.
C. mamiana (Sacc.) Trav. in *Fl. Ital. Crypt.* II (1906), 201.

Producing small, characteristically widely erumpent pustules on the surface. There is a sparse production of stromatic hyphae in and upon the surface layers of bark which causes the periderm to be ruptured and thrown back, exposing the cortical disc which is light coloured when fresh. These open pustules may be small and scattered or larger, longitudinally elongated, 1–4 mm. in length, or confluent in longitudinal series for long distances. The perithecia are spherical or flattened, 480–640 × 240–480μ, arranged in dense clusters or irregularly scattered in the upper layers of the bark and are separately erumpent through the cortical disc as loose clusters of more or less elongated sinuous ostioles, which, at maturity, are characteristically flattened or band-like. There are no blackened zones in either bark or wood. The asci are clavate and 40–54 × 7–11μ. The spores are biseriate or irregularly triseriate, long fusiform, somewhat curved or inequilateral, two-celled, hyaline, slightly constricted at the septum, 15–20 (23) × 2–3 (3·5)μ. (Appendaged according to some descriptions but appendages seldom seen.)

Host: *Acer Pseudo-platanus.*

British collections: **M.H.** 153, Mickleham, July, 1923; 183, Copford near Colchester, June, 1924; 189*b*, Cambridge, May, 1925.

CONIDIAL CONNECTIONS:

Myxosporium Tulasnei Sacc. *Syll.* III (1884), 723.
M. spathianum Allesch. in *Hedw.* XXXVI (1897), 163.
Septomyxa Negundinis Allesch. in *Ber. Bay. Bot. Ges.* V (1897), 22.

S. Tulasnei (Sacc.) v. Höhn. in *Ann. Myc.* I (1903), 527.
Phomopsis Tulasnei (Sacc.) v. Höhn. in *Sitz. Akad. Wiss. Wien*, CXV (1906), 681.

The Tulasnes give the "stylospores" of this *Valsa longirostris* as 13–16 × 5·3μ and one-septate at maturity. Allescher's *M. spathianum* has one-celled conidia 8–11 × 2–3·5μ and his *S. Negundinis* two-celled conidia 12–20 × 2·5–4μ. Saccardo describes the conidia of *M. Tulasnei* as 18–25 × 2·5–3μ. This synonymy is taken from von Höhnel. The imperfect stage seems to be confused in the literature and is based on observation alone. Collection No. 189*b* in the Mason Herbarium shows immature conditions with conidial locules with perithecial initials beneath. Numerous locules which are soon confluent are formed within an ectostroma just beneath the periderm. Upon the rupture of the periderm the fused locules break open to the exterior and expose the hymenial layers. The conidia are long fusoid, one-celled, hyaline, 9–14 (16·5) × 2–2·5μ. Sometimes a faint or apparent septum is present, but it is doubtful whether this is more than a separation of the protoplast.

6. **Cryptodiaporthe pyrrhocystis** (Berk. & Br.) Wehm.

Sphaeria tessera Fr. (?) *Syst. Myc.* II (1823), 481.
Diatrype pyrrhocystis Berk. & Br. in *Ann. Mag. Nat. Hist.* ser. 3, III (1859), 364.
Diaporthe pyrrhocystis (Berk. & Br.) Fuck. *Symb. Myc.* (1869), 204.

Visible on the surface as irregularly elongate, perforate ruptures of the periderm which expose a disc the colour of the bark cortex and containing a number of separately erumpent papillate ostioles. There are no blackened zones in either the bark or wood. Perithecia spherical or irregular from crowding, 250–400μ in diameter, with light brown walls 20μ thick. The perithecia are always in groups and have more or less of a development of entostromatic mycelium about them and usually a small ectostromatic cap above them. The ostioles are usually separately erumpent through this broad, flat, cortical disc, which causes an irregular rupture of the periderm. Asci 85–105 × 16–18μ. Spores biseriate, ellipsoid, rounded at the ends, two-celled, hyaline, constricted at the septum, 21–27 (30) × 6–9μ, with a short, stout, hyaline appendage at each end.

Host: *Corylus Avellana.*

British collections: Rab. *Fung. Eur.* 136. Plowr. *Sphaer. Brit.* I, 35.

This species approaches *D. decedens* but has larger spores and a more widely erumpent cortical disc.

CONIDIAL CONNECTIONS:

Small allantoid, one-celled, hyaline conidia measuring 9–12 × 1·5μ were seen on Plowr. *Sphaer. Brit.* I, 35 and similar conidia measuring 13–15μ in length were seen on Krieg. *Fung. Sax.* 84.

7. **Cryptodiaporthe Aesculi** (Fuck.) Petr.

Ann. Myc. XIX (1921), 119

Cryptospora Aesculi Fuck. *Symb. Myc.* (1869), 193.
Cryptosporella Aesculi (Fuck.) Sacc. *Mich.* I (1877), 30.
Valsa Hippocastani Cke in *Grev.* XIII (1884), 98.
V. aesculicola Cke in *Grev.* XIV (1885), 47.
Diaporthe Hippocastani (Cke) Berl. & Vogl. *Syll. Add.* (1886), 105.
D. aesculicola (Cke) Berl. & Vogl. *Syll. Add.* (1886), 105.
D. Aesculi (Fuck.) v. Höhn. in *Ann. Myc.* XVI (1918), 116.

Appearing on the surface as circular perforations or pustulate ruptures of the periderm, 0·2–0·5 mm. in diameter, exposing a minute, white flocculent, ectostromatic disc, through which a small cluster of cylindrical, sometimes slightly elongated, ostioles are erumpent. There are no blackened zones within the substratum. A small white ectostromatic cushion, within which irregular pycnidial chambers are formed, is produced within the periderm. The perithecia are spherical or somewhat flattened, have a thick heavily blackened wall, are 240–480 × 240–400μ and are formed in small groups within the upper bark layers or within the periderm itself. They are formed beneath the ectostroma through which they are collectively erumpent. Asci clavate with a refractive ring in the apex, 80–90 × 8–9·5μ. Spores biseriate, one-celled, ellipsoid, when immature, becoming two-celled and fusoid when mature, hyaline, constricted at the septum, 14–23 × 4·5–7μ. When young the spores may show very slight gelatinous appendages at each end.

Host: *Aesculus Hippocastanum.*

British collections: Vize, *Micr.-Fung. Brit.* 597.

This species represents a group with small conical light coloured ectostromata and closely adherent periderm.

CONIDIAL CONNECTIONS:

Myxosporium (?) *aberrans* Sacc. in *Mich.* I (1878), 128.
Septomyxa Aesculi Sacc. *Syll.* III (1884), 766.
Fusicoccum Aesculi Corda in Sturm *Deutsch. Crypt. Fl.* III, Ab. 2 (1829), 111, pl. 52.
Cryptosporium Hippocastani Cke in *Grev.* XIII (1884), 4.
Fusicoccum Hippocastani (Cke) v. Höhn. in *Bot. Inst. Techn. Hochsch. Wien*, VI, 1 (1929), 20.
Septomyxa Aesculi (Corda) Petr. in *Ann. Myc.* XIX (1921), 92.

The imperfect stage of Fuckel's *Cryptospora Aesculi* was described by Saccardo as *Septomyxa Aesculi*. The conidia were given as fusoid-ellipsoid, sometimes slightly curved, two-celled, 15–16 × 3–4μ. Both Petrak and von Höhnel have argued theoretically as to the imperfect stage. The above synonymy is taken from Petrak who gives the conidia as 14–32 × 3–5μ. Many exsiccata show an accompanying conidial stage, apparently *Septomyxa Aesculi*, in which the conidia are elongate-fusoid, slightly curved, one-celled or with a faint septum, 14–23 × 2·5–4μ. The conidia seem to be quite variable in size and septation. Grove (*Kew Bull.* (1919), 183) gives *Phoma diplodioides* Sacc. and *Diplodina truncata* Sacc. as synonyms of the above.

8. **Cryptodiaporthe hranicensis** (Petr.) Wehm.

Diaporthe hranicensis Petr. in *Ann. Myc.* XII (1914), 477.

Appearing upon the surface as broad, angular, pustulate ruptures of the periderm, 1–3 mm. in diameter, through which there is erumpent a dense cluster of stout (100–200μ in diameter), elongate, cylindrical ostioles with tapered conical tips and clothed with a greyish pulverulence. There may be a slight blackening of the bark surface about the ostioles but there are no blackened zones within the substratum. Perithecia 480 × 320–480μ, clustered in groups of 12–20 within the upper bark cortex, which is often filled with a sandy furfuraceous deposit of crystalline matter. Asci clavate, stipitate, with a thickened apical wall and a refractive ring in the apex, 60–80 × 8–9μ (sp. p. 50–60μ). Spores biseriate above, uniseriate below, oblong ellipsoid to ellipsoid, sometimes slightly inequilateral or curved, finally faintly one-septate, hyaline, not constricted at the septum, 11–15 × 2·5–4μ.

Host: *Tilia*.

British collections: **M.H.** 955, Oscott College, April, 1930; 957, Richmond Park, April, 1928.

This species appears to be somewhat intermediate between *Cryptodiaporthe* and *Cryptosporella*. The spores are quite variable in shape and often one-celled. Conidial chambers were seen on the flanks of the ectostromata of No. 955. These chambers were covered by the periderm only and contained numerous bacillar, one-celled, hyaline conidia, 3·5–6·5 (8) × 1–1·5μ.

APIOPORTHE v. Höhn. emend.

Sitz. Akad. Wiss. Wien, CXXVI (1917), 381

Perithecia immersed in the substratum, usually clustered. Entostromatic development scanty or variously developed as a mycelial weft or definite tissue about the perithecia. Ectostroma also various. Tissues above the perithecia sometimes blackened but no definite

marginal zones within the substratum as in *Diaporthe*. Asci clavate with refractive ring in the apex, stalks evanescent. Spores hyaline, unequally two-celled, fusoid to pyriform, commonly tapered toward one end which contains the smaller cell. Conidial stages consisting of variously shaped cavities formed within a stromatic pycnidial tissue by the simultaneous breaking up into conidia of the hyphae in these locular areas, without the formation of a definite hymenium.

Petrak (*Ann. Myc.* xxvii (1929), 401) has segregated a genus *Apioporthella* on the basis of *A. vepris* to include those forms of *Apioporthe* with a poorly developed stroma. It is true that the type species *A. anomala* (Pk) v. Höhn. has a very strongly developed entostroma, but inasmuch as there are all gradations of stromatic development within the genus as here outlined, it hardly seems worth while to attempt a separation on this basis.

1. **Apioporthe vepris** (De Lacr.) Wehm.

Sphaeria vepris De Lacr. in Rab. *Fung. Eur.* (1859), 443.
Calosphaeria idaeicola Karst. *Fung. Fenn.* (1866), 856.
Diaporthe vepris (De Lacr.) Fuck. in Nits. *Pyr. Germ.* (1870), 300.
Gnomonia idaeicola Karst. *Myc. Fenn.* II (1873), 126.
Diaporthe nidulans Niessl, *Notiz. Pyr.* (1876), 49.
D. nidulans forma *exigua* Niessl, *Notiz. Pyr.* (1876), 50.
Valsa obscura Pk in *N.Y. St. Mus. Rep.* xxviii (1876), 73.
Gnomoniella idaeicola (Karst.) Sacc. *Syll.* I (1882), 418.
Diaporthe obscura (Pk) Sacc. *Syll.* I (1882), 627.
D. idaeicola (Karst.) Vestergr. *Bot. Notis.* (1899), 156.
Chorostate nidulans (Niessl) Trav. in *Fl. Ital. Crypt.* II (1906), 210.
Gnomonia vepris (De Lacr.) Kiessl. in *Beih. Bot. Centr.* xxix (1915), 401.
Apioporthe obscura (Pk) Wehm. in *Papers Mich. Acad. Sci.* viii (1928), 219.

Usually forming longitudinally elongate pustulate ruptures of the periderm with small central blackened discs containing the scarcely erumpent ostioles. Sometimes erumpent merely as circular blackened discs, 0·1–0·2 mm. in diameter, composed of one or a few ostioles. No blackened zones within the substratum. Perithecia 160–300 × 150–200μ, usually in definite clusters, but occasionally in small thickly scattered groups. Stromatic development variable. Disc sometimes composed only of a few fused ostioles, again composed of a definite ectostromatic cushion of brownish parenchyma through which the ostioles are erumpent. Sometimes the perithecia may also be more or less imbedded within this stromatic matrix. Asci clavate, 30–40 × 6–8μ. Spores obliquely biseriate, ellipsoid, narrowed towards one end, often somewhat curved, unequally two-celled, often constricted

at the septum, 6–9 (10) × 2–2·5μ and often with a short, bristle-like, hyaline appendage at each end.

Host: *Rubus*.

British collections: Plowr. *Sphaer. Brit.* III, 63 (*D. rostellata*). Non Plowr. *Sphaer. Brit.* II, 71 (*S. vepris*).

This is the only species of the genus *Apioporthe* of which I have records from Great Britain. It is common on *Rubus* throughout Europe and America.

CONIDIAL CONNECTIONS:

Phoma vepris Sacc. *Syll.* III (1884), 76.
Phomopsis vepris (Sacc.) v. Höhn. in *Sitz. Akad. Wiss. Wien*, CXV (1906), 681.

Nitschke reports the conidia of this species as fusiform to subcylindric, 6 × 1·5μ. In my cultures (*Amer. Journ. Bot.* VIII (1921), 244) of this species there were produced similar conidia which were one-celled, hyaline, ellipsoid to fusoid-cylindric, 4–7 × 1–2μ. They were cut off irregularly from loose hyphae in the central portion of a stromatic pycnidium.

DIAPORTHOPSIS Fabre.

Ann. sci. nat. sér. 6, XV (1883), 35

Perithecia immersed, scattered singly or crowded within an evenly effuse entostromatic area, separately erumpent. Surface of substratum usually more or less blackened. Entostromatic areas often margined by a blackened zone as in *Diaporthe*. Asci clavate, with evanescent stalks which free the asci within the perithecium. Spores hyaline, one-celled, ellipsoid to fusoid, straight or curved, sometimes appendaged.

KEY TO BRITISH SPECIES OF *DIAPORTHOPSIS*

I. Forming small elongated blackened patches (0·5–3 mm.) on surface, ventral zone definite. 2, *D. pantherina* (*Pteris*)

II. Surface blackening, if present, not in small isolated areas, ventral zone faint or absent. 1, *D. Angelicae* (*Umbelliferae*)

1. **Diaporthopsis Angelicae** (Berk.) Wehm.

Sphaeria Angelicae Berk. in *Mag. Bot. and Zool.* (1837), 48.
S. Berkeleyi Desm. in litt. ad Mont. in *Ann. sci. nat.* sér. 2, VIII (1837), 358.
Diaporthe Berkeleyi (Desm.) Nits. *Pyr. Germ.* (1870), 273.
Sphaeria Angelicae Fuck. *Symb. Myc.* (1869), 113.

Leptosphaeria nigrella Auersw. *Myc. Eur. Pyr.* (1869), Pl. 12, f. 163.
Diaporthe nigrella (Auersw.) Niessl, *Beitr.* (1872), 51.
D. foeniculacea Niessl in litt. ad de Thüm. *Contr. Myc. Lusit.* II (1880), 30.
D. tetraspora Sacc. in *Mich.* II (1881), 250.
Gnomoniella Angelicae (Fuck.) Sacc. *Syll.* I (1882), 417.
Diaporthe denigrata Wint. in Sacc. *Syll.* I (1882), 649.
Diaporthopsis nigrella (Auersw.) Fabre in *Ann. sci. nat.* sér. 6, XV (1883), 35.
Gnomonia Angelicae (Fuck.) Wint. in Rab. *Krypt. Fl.* I (2) (1887), 577.

Nearly invisible at first, no blackening of the substratum when young and immature; ostioles barely visible as minute black dots. Surface of substratum later becoming more or less blackened over wide areas, which, when exposed by defoliation of the periderm, often show a violet tinge. Ventral zones absent or rather faintly developed within the pith. Ostioles small, barely erumpent as small papillate or cylindrical or conical projections, or rarely somewhat elongated. Perithecia small, spherical or flattened, 240–400 × 160–240μ, scattered singly or sometimes crowded, usually rather deeply immersed within the pith and with long slender necks. The perithecia when young are filled with numerous, broad, paraphysis-like hyphae. Asci clavate at first, becoming long-cylindric, 40–50 (85) × 4–7μ. Spores biseriate to obliquely uniseriate, ellipsoid-fusoid, one-celled, hyaline, non-constricted, 9–15×3–4 (4·5) μ.

Hosts: Various Umbelliferae.

British collections: Berk. *Brit. Fung.* 88 (*S. Angelicae*).

The above species is very similar to *D. Arctii* on the same hosts, and is difficult to separate, especially when *D. Arctii* is in an immature condition with one-celled spores. The surface of the substratum in *D. Angelicae*, however, is usually not so heavily blackened and incrusted and often has a violet tinge. The perithecia are also smaller on the average and are deep-seated in the pith. The spores are also broader, never constricted and have three guttulae instead of four, with one guttula in the centre of the spore. The spores also remain one-celled.

CONIDIAL CONNECTIONS:

Sphaeria complanata Tode, *Fung. Meckl. Sel.* II (1791), 21.
Phoma complanata (Tode) Desm. in *Ann. sci. nat.* sér. 3, XVI (1851), 299.

Given by Fuckel as the conidial stage of his *Sphaeria Angelicae*. Conidia oblong, curved, 5–6 × 2–2·5μ.

Phoma eryngiicola Brun. in *Bull. Soc. Bot. France*, XXXVI (1889), 337.
Phomopsis eryngiicola (Brun.) Trav. in *Fl. Ital. Crypt.* II (1906), 251.

Given by Traverso as the imperfect stage of *Diaporthe nigrella*. Conidia cylindrical-oblong, 10 × 3μ.

Phoma asteriscus Berk. & Br. in *Ann. Mag. Nat. Hist.* ser. 2, v (1850), 368.

Phomopsis asteriscus (Berk. & Br.) Grove in *Kew Bull.* (1917), 53.

Conidial connections given by Grove. Alpha conidia ellipsoid, 7–8 × 2–2·5μ. Sporophores cylindrical, arcuate, 12–20 × 1·25μ.

2. **Diaporthopsis pantherina** (Berk.) Wehm.

Sphaeria pantherina Berk. in *Mag. Zool. and Bot.* I (1837), 47.

Diaporthe pantherina (Berk.) Cke in *Grev.* VII (1879), 82.

On surface as fusoid to elongate-oblong dark coloured areas which are faintly or definitely outlined and 0·5–3 × 0·2–0·5 mm. Ventral zones definite within the stem. Perithecia 240–400μ in diameter, scattered singly and separately erumpent. Ostioles barely erumpent. Asci 64 × 13μ. Spores ellipsoid-fusoid, one-celled, hyaline, 2–3 guttulate, 11–12 × 3·5–4·5 (5) μ.

Host: *Pteris aquilina*.

British collections: Berk. *Brit. Fung.* 34; Plowr. *Sphaer. Brit.* III, 59.

Cooke (*Handb.* No. 2689) gives the spores of this species as having two or more obscure septa. Berkeley's *Brit. Fung.* 34 (in Farlow Herb.) showed no spores but Plowright's exsiccatum showed one-celled spores with 2–3 guttulae. Cooke probably mistook the guttulae for cells.

In addition to the above species, the following which have been described under the genus name *Diaporthe*, but which should be excluded, have been reported from Great Britain.

Diaporthe acus (Blox.) Cke in *Grev.* VII (1879), 81.

Sphaeria acus Blox. in Curr. *Trans. Linn. Soc. Lond.* XXII (1859), 325.

This species is a *Gnomonia* resembling *D. Arctii* but without any blackening of the substratum and with spores 9·5–12 × 2·5–4μ.

Host: *Rumex* sp.

British collections: **K**, Herb. Currey (Bloxam) and from Havin Bridge; Herb. Cooke, Kew, March, 1883; Herb. Berkeley, on *Rumex*; non Herb. Cooke, Neathead, Norfolk, September, 1864 (all under *S. acus*).

Diaporthe bitorulosa (Berk. & Br.) Sacc. *Syll.* I (1882), 608.

Sphaeria xanthostroma Mont. in *Ann. sci. nat.* sér. 2, I (1834), 301.

Valsa bitorulosa Berk. & Br. in *Ann. Mag. Nat. Hist.* ser. 3, III (1859), 367.

Diaporthe mucosa Wint. in Sacc. *Syll.* I (1882), 609.

Melanconis xanthostroma (Mont.) Schroet. *Krypt. Fl. Schles.* (1908), 441.

This species is a typical *Melanconis* (*M. xanthostroma*). The synonymy and exsiccata of the species are greatly confused and only a few of the synonyms are given here. It grades off into a second species, *M. hyperopta* (Nits.) Wehm., which has narrower, more acute spores which do not have the thick gelatinous walls characteristic of *M. xanthostroma*.

Host: *Carpinus Betulus*.

British collections: Berk. *Brit. Fung.* 296.

Diaporthe Bloxami (Cke) Berl. & Vogl. *Syll. Add.* (1886), 105.
Valsa Bloxami Cke in *Grev.* XIV (1885), 47.

The type of this species is apparently *Melanconis stilbostoma* on *Betula*. Cooke gives no host on the type sheet, and gives *Fagus* as doubtful in his description.

Host: *Betula* (?).

British collections: **K**, Herb. Cooke, 141, from Bloxam; 312, *Sphaeria* on Birch.

Diaporthe elaeostroma (Cke) Berl. & Vogl.
See *D. sulphurea*.

Diaporthe Epilobii Fuck.
See *D. tosta*.

Diaporthe farcta (Berk. & Br.) Niessl, *Not. neu. u. kr. Pyren.* (1876), 51.
Sphaeria farcta Berk. & Br. in *Ann. Mag. Nat. Hist.* ser. 2, IX (1852), 324.

This species, as represented in Plowr. *Sphaer. Brit.* II, 68, is mostly an effuse *Anthostroma*. Type material has not been seen.

Host: *Ulmus*.

Diaporthe Innesii (Curr.) Fuck. *Symb. Myc.* (1869), 204.
Valsa Innesii Curr. in *Trans. Linn. Soc. Lond.* XXII (1859), 281.

This is *Pseudovalsa platanoides* (Pers.) Wint. Von Höhnel (*Ber. Deut. Bot. Ges.* XXXV (1917), 252), has called it a four-celled *Diaporthe* (*D. platanoides*) (Pers.) v. Höhn.

Host: *Acer Pseudo-platanus*.

British collections: **M.H.** 180, North Hill, Minehead, March, 1927; 181, Aviemore, September, 1927; 182, Mickleham Woods, April, 1927; 184, Mickleham, July, 1927; 186, Llanbedr, Wales, October, 1924 (as *Calospora platanoides*).

Diaporthe lirella (Moug. & Nest.) Nits. in Fuck. *Symb. Myc.* (1869), 206.
Sphaeria lirella Moug. & Nest. in Fries *Elench. Fung.* II (1828), 105.
Gnomonia lirella (Moug. & Nest.) Auersw. *Syn. Pyr.* (1869), 22.

This species is not a good *Diaporthe* but rather one of the Clypeo-

sphaeriaceae (*Hypospila*?). The perithecia are more or less fused together in a stromatic mass beneath a small longitudinal Clypeus-like blackening of the surface.

Host: *Spiraea ulmaria.*

British collections: Vize, *Micr.-Fung. Brit.* 593. Berk. *Brit. Fung.* 37. Cke, *Fung. Brit.* 239. non Plowr. *Sphaer. Brit.* II, 73.

Diaporthe platanoides (Pers.) v. Höhn.

See *D. Innesii.*

Diaporthe rostellata (Fr.) Nits. *Pyr. Germ.* (1870), 298.

Sphaeria rostellata Fr. *Syst. Myc.* II (1823), 476.
S. Rubi Mart. *Flor. Erlang.* (1817), 487.
S. clavus Schm. sec. Fries.
Diaporthe Rubiae H. Fab. *Sphér. Vaucl.* (1880), 46.
D. gallophila Ell. in *Bull. Torr. Bot. Cl.* VIII (1881), 90.
D. Rubi (Mart.) Rehm f. *appendiculata* in v. Höhn. Herb. A4051 (7014).

This species is a *Gnomonia.* The perithecia are often crowded in the upper bark, but they are separately erumpent and there is no stromatic development nor blackening of the tissues in the substratum.

Host: *Rubus* spp.

British collections: Plowr. *Sphaer. Brit.* III, 63. **M.H.** 908, Llanbedr, Wales, October, 1926; 909, Ham Common, April, 1925.

Diaporthe sulphurea Fuck. *Symb. Myc.* (1869), 205.

Valsa flavo-virens Otth in Herb. Nits.
Diaporthe flavo-virens Otth *Bern. Mittheil.* VI (1868), 47.
D. affinis Sacc. in *Mich.* I (1877), 28.
Valsa olivaestroma Cke in *Grev.* XIV (1885), 48.
Diaporthe elaeostroma (Cke) Berl. & Vogl. *Syll. Add.* (1886), 107.
Chorostate sulphurea (Fuck.) Trav. in *Fl. Ital. Crypt.* II (1906), 209.
C. affinis (Sacc.) Trav. in *Fl. Ital. Crypt.* II (1906), 209.
Melanconis sulphurea (Fuck.) Petr. in *Ann. Myc.* XXI (1923), 321.
Discodiaporthe sulphurea (Fuck.) Petr. in *Hedw.* LXII (1921), 291.

This is a *Melanconis* as given by Petrak. It is a continuation of the range of variation of *M. hyperopta* and *M. xanthostroma*, having spores ($17{\cdot}5$–27×6–$9{\cdot}5\mu$) larger than either of these species. The spores have the thick walls of *M. xanthostroma* but the acute tips of *M. hyperopta.*

Host: *Corylus Avellana.*

British collections: **K**, No. 2009 (Herb. Cooke 209), Jerdon, 1885. **M.H.** 392, Arundel, April, 1930.

Diaporthe tosta (Berk. & Br.) Niessl in *Hedw.* XIV (1875), 131.

Sphaeria tosta Berk. & Br. in *Ann. Mag. Nat. Hist.* ser. 2, IX (1852), 381.
Sphaerella Fuckelii Pass. *Erb. Critt. Ital.* II (1871), 645.

Diaporthe Epilobii Fuck. *Symb. Myc.* (1869), 206.
Didymosphaeria Fuckeliana (Pass.) Sacc. in *Mich.* I (1878), 440.
Didymella Fuckeliana (Pass.) Sacc. *Syll.* I (1882), 556.
D. tosta (Berk. & Br.) Sacc. *Syll.* I (1882), 556.

This species is a typical *Didymella*. The blackening of the surface of the substratum in some cases is the only reason for placing it in the genus *Diaporthe*.

Host: *Epilobium hirsutum*.

British collections: **K**, Herb. Berk. 1879; Rudloe, February, 1843 (*S. tosta*). Plowr. *Sphaer. Brit.* II, 82 (*S. tritorulosa*); III, 42 (?) (*D. Epilobii*).

The following species have been described from England, but have not been seen by me.

Diaporthe biconica (Curr.) Sacc. *Syll.* XI (1895), 310.
Valsa biconica Curr. in *Trans. Linn. Soc. Lond.* XXII (1858), 279.

From the description, this species seems to be a *Melanconis*. No host is given.

Diaporthe pulchra (Curr.) Sacc. *Syll.* I (1882), 617.
Valsa pulchra Curr. in *Trans. Linn. Soc. Lond.* XXII (1858), 279.

No conclusions can be drawn from the short description of this species. No host is given.

A CONTRIBUTION TO THE LIFE-HISTORY OF *SORDARIA FIMICOLA* (FOUR-SPORED FORM) WITH SPECIAL REFERENCE TO THE ABNORMAL SPORES

By WINIFRED M. PAGE, M.Sc.

(With 5 Text-figures)

The four-spored form of *Sordaria fimicola* appeared on a plate which had been inoculated with some Discomycetes growing on soil. The material had been collected by Mrs H. S. Williamson in the autumn of 1930 at Oxshott.

I had not previously observed this variety, although I have made collections of coprophilous fungi during the last ten years. The eight-spored form is one of the commonest pyrenomycetous fungi to be found on dung.

Methods

The cultures were grown on 3 per cent. agar rabbit dung decoction. The pellets were boiled and the liquid strained and diluted until it was pale brown. Small pieces of filter-paper were added to the medium. Several synthetic media were tried but the growth was not so abundant.

The young stages of the perithecia, the mycelium and germinating spores were examined in the fresh material and also in preparations stained with erythrosine and mounted in glycerine jelly (8).

Material for the study of the asci was fixed in 70 per cent. alcohol. A number of other fixing fluids was tried, but the density of the food material in the spores rendered them unsuitable.

Sections were cut 12μ and 20μ thick and stained with Heidenhain's haematoxylin followed by light green in clove oil.

The cultures were kept in diffuse light at the ordinary laboratory temperature.

Germination of the spores and mycelium

When the lid of the dish in which the original culture had been grown was first inspected, spores greatly varying in size were seen (Fig. 1).

The spores can be placed into three categories:

(*a*) The smallest or dwarf spores contain two nuclei and give rise to mycelia of two kinds, *A* and *B*.

(*b*) The normal spores have four nuclei and give rise to homothallic mycelia. By far the greatest number belongs to this group.

(*c*) The largest or giant spores contain eight nuclei and give rise to homothallic mycelia.

The difference in size was considerably more marked than that described by Dowding (9) for *Pleurage* (*Podospora*) *anserina*. All types of spore germinated readily without preliminary treatment, many starting growth on the glass lid of the dish. The method of spore discharge agrees with that of the eight-spored form (7).

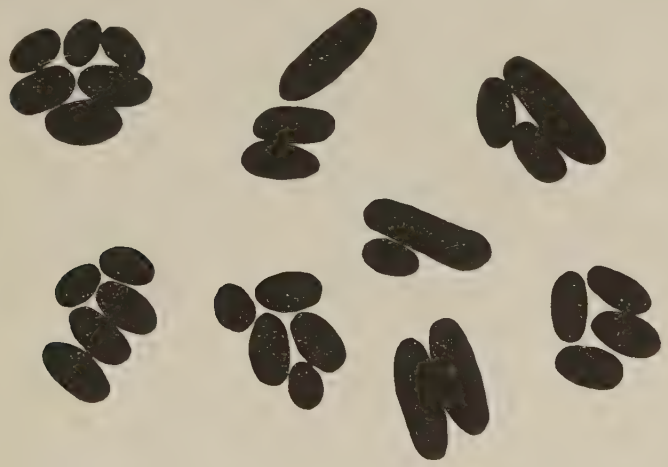

Fig. 1. Groups of spores shot on to lid of Petri dish. × 400.

The details of germination are those characteristic of the spores of those members of the Sordariaceae which I have already studied (6).

A thin-walled swelling is first observed which later sends out a cylindrical tube, usually at the point remote from the spore. This

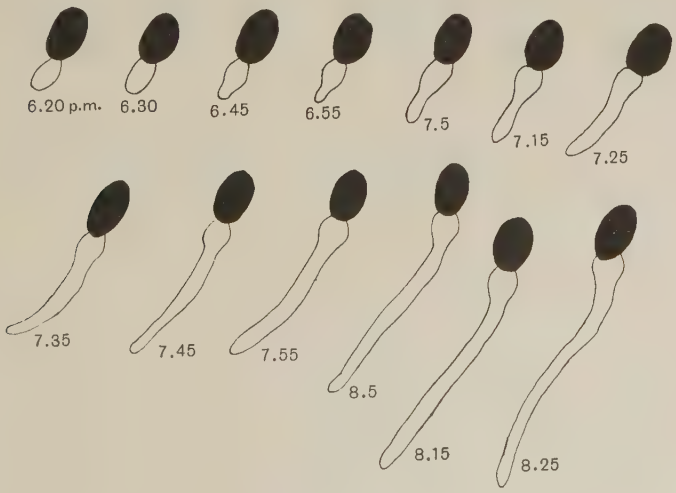

Fig. 2. Early stages of germination of spore. × 200.

continues to lengthen and side branches are formed. The early stages of growth have been watched under the microscope and camera lucida drawings made at intervals, for a period of two hours (Fig. 2).

The mycelium stands up very slightly from the medium, grows fairly rapidly and branches freely. Each cell has two or more nuclei.

Mycelial fusions do not take place unless the space is limited. Mycelia from opposite sides of the dish will join on meeting. If two branches of the same mycelium are forced to take different directions by cutting a circular hole in the agar, they will unite when they meet after curving round the space.

Perithecial initials and perithecia

In mycelia grown from normal or giant spores perithecia may appear in any part of the culture. A short branch forms a coil which rapidly becomes complicated and a spherical pseudo-parenchymatous body is formed. This darkens and enlarges and a neck begins to form. Finally the flash-shaped, opaque, black fruit-body is produced.

This development is similar to that of the eight-spored form described by Dangeard (4), Satina (5), and Page (6).

In cultures grown from dwarf spores the first stages of perithecium formation can be traced, but the spherical bodies never enlarge, and remain colourless. A great number of these bodies is formed in clusters and the cultures have a white matted appearance.

The asci

The young ascus contains a single large nucleus. Divisions take place giving rise to eight nuclei, after which the spores begin to be cut off. A further division takes place so that the mature ascus contains sixteen nuclei.

There is a great variation in the number and size of the spores in an ascus (Fig. 3). This is in contrast to the other members of the Sordariaceae which have been studied both by other workers and by myself (1, 2, 3, etc.). The family as a whole shows great regularity in size of spore.

In the form under discussion the normal asci contain four similar spores, each containing four nuclei. There is, however, a considerable number of asci containing four spores of slightly different size. All those examined in section, however, showed four nuclei to each spore.

In every perithecium examined there have been found several asci containing five spores, three of normal size and two dwarfs.

There have also been a slightly smaller number of three-spored asci with one giant spore and two normals. In a few cases six spores to the ascus occur and more rarely one, two, and seven. No eight-spored ascus has been observed.

A number of single-spore cultures of dwarf spores was made, and all failed to fruit. Portions of the mycelium of two of these cultures were placed on opposite sides of a dish and the experiment repeated with a great number of combinations. It was found that there were two definitely different strains and these were arbitrarily named *A* and *B*. There was no observable difference in the mycelium or abortive perithecial initials of the two strains.

Mycelia from dwarf spores have been transferred periodically and kept for over a year. Fruits have never been formed.

Fig. 3.

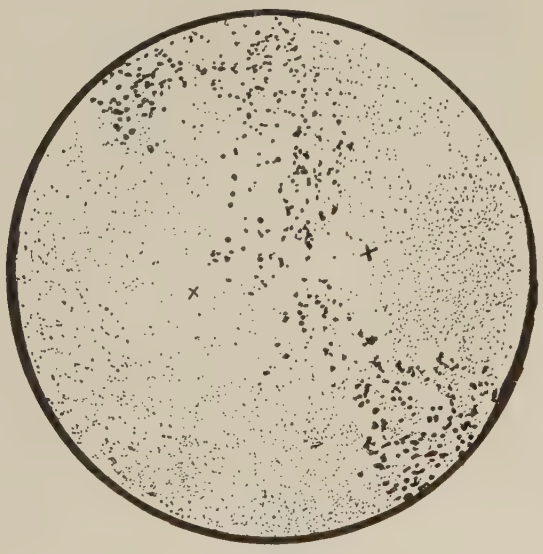

Fig. 4.

Fig. 3. Types of asci showing variation in number of spores. × 400.

Fig. 4 Diagram from photograph of culture from *A* and *B* spores. Points of inoculation indicated by *x*. The fine dots show abortive perithecia.

The results of a number of experiments involving several hundred cultures showed:

(1) Neither *A* nor *B* cultures fruited alone.

(2) When an *A* mycelium came into contact with one that had originated from a complementary spore, fruits were formed in the vicinity of the meeting place. The position of the perithecia so formed varied considerably, but they were never at any great distance from the points of contact (Fig. 4). The stimulus to form fruits was not transmitted throughout the mycelia concerned, as portions taken from parts remote from the line of meeting gave sterile cultures (Fig. 5).

(3) Branches from two similar mycelia united but no perithecia were formed.

(4) Mycelia from normal or giant spores whilst fruiting themselves did not stimulate those from dwarf spores to fruit.

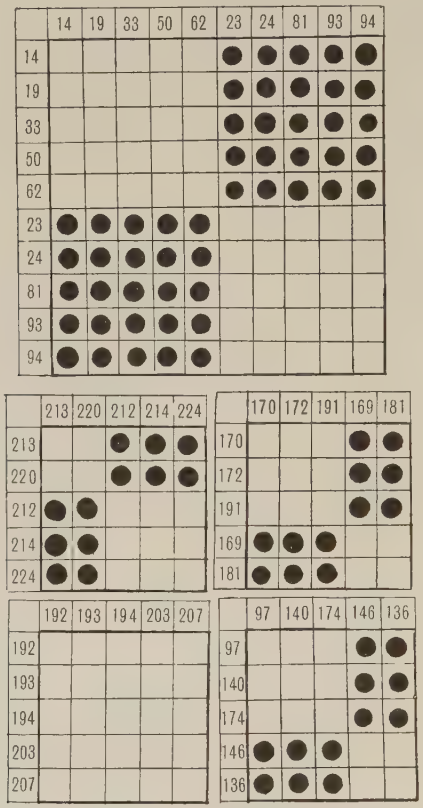

Fig. 5. Tables showing results of crossing mycelia from *A* and *B* spores.

(5) On the few occasions when it was found possible to germinate dwarf spores from the same five-spored ascus, they gave rise to mycelia of opposite complement.

The work has been carried out at Birkbeck College, University of London. Thanks are tendered to Prof. Dame Helen Gwynne-Vaughan for much stimulating advice and to Mr J. Ramsbottom for naming the fungus.

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THE MANUSCRIPT OF JAMES BOLTON'S *ICONES FUNGORUM CIRCA HALIFAX SPONTE NASCENTIUM*

By C. L. SHEAR

The Library of the U.S. Department of Agriculture has recently purchased from an old bookseller in Zurich, Switzerland, what proves to be the original manuscript notes and drawings upon which the author, James Bolton, based his work, entitled, *An History of Fungusses growing about Halifax* (England), 4 volumes, 182 copper plates, Halifax, 1788–91.

This manuscript consists of six folio volumes bound in boards with morocco back. This is apparently the original binding and is very well preserved. The paper is heavy hand-made with rough surface very suitable for water-colour illustrations. The volumes contain 244 water-colour plates representing the plants mostly in their natural size with brief remarks on the page opposite each illustration. The first fasciculus contains the following preface in Bolton's hand dated 1784:

PREFACE*

The Parish of Halifax and its Neighbourhood, consisting wholely of Hills and valleys, and abounding with Watersprings and Rivulets, deep dark Glenns, rocky Precipices, Large moors of Moss and Heath, Bushy Bogs, and steep and Rocky Woods, with Fields, Meadows, and Pasture Grounds, of every aspect and of every Soil, Is thereby rendered so rich in its Vegetable productions that it may without impropriety be termed a Natural Botanic Garden. But in no Class of Plants more deservedly so than in the Cryptogamia, and of these in particular the Fungii; There is not perhaps in this or any other Kingdom, a spot of like extent, productive of so vast variety. Consequently there are many species which are new or unknown to the Botanic World, and as nothing was created by the all Wise Author of Nature but for some Great and Good end, (were we acquainted with their uses and their virtues) Therefore every attempt to Illustrate their History, by investigating and ascertaining their species, must, if done from propper motives, be esteemed Laudible. An attempt of this kind I have had in view for a number of years, have kept an observing eye upon them at all seasons, and have from time to time made likenesses in Drawing from such as I collected, in which Work I have all along been scrupulously exact in getting a just representation of each in the various stages of its growth, from its first springing up to its maturity or Decay, and from these sketches partly, and partly from the plants themselves, have I this summer made up this first fasciculus with a view of Laying it at the Feet of the greatest and best Judge, and the noblest and most generous encorager of Natural History now alive in Great Britain, If it is fortunate enough to obtain you Graces approbation, it may be succeeded Annualy by three more Fasciculi of equal bulk, which would take in all the Fungii of this neighbourhood both such as are, and such as are not known, To execute such a work well, and

* Capitalisation and spelling are as in the original.

MEMORANDUM.

In this and the three preceding Volumes, the Objects (one Hundred and Eighty two species) which are exhibited in about five Hundred figures, were all gathered in their native places of growth by me, or sent by my Friends when newly gathered; and every figure drawn immediately from those Objects by my own hands.

There are many species of English Fungii mentioned by Authors, which are not here figured, and yet may possibly some of them grow near me, tho I have not discovered them in my researches, which have been now regularly pursued for more than twenty Years; — I shall go on in the inquiry as long as Health and strength permit, and such as I may have the good fortune to meet with I will take care to add to Your Lordships store; For my desire is to acquit myself as propperly and faithfully as I can to all those whose Generosity enables me to follow my favourite pursuit. I am

My Lord with the truest sense of
Humility and Gratitude.
Your Lordships
most Obedient servant
James Bolton

Halifax
Nov.r 4.3d
A.D 1787

to have the Honour of Dedicating and presenting it to Your Grace, would afford the Greatest and most sincere Happiness to him, who is not further ambitious, than to make Himself serviceable To the Noble Duchess Dowager of Portland.

Halifax 21st Sep.r 1784,
James Bolton

This shows that the first volume was prepared under the patronage of Her Grace, Margaret Cavendishe, Duchess Dowager of Portland. The Duchess having died before the work was completed the later volumes were prepared and the *History* published under the patronage of the Earl of Gainsborough; as is indicated in the fourth volume of the manuscript dated November 3rd, 1787, and also on the title-page of the first volume of the printed work, 1788.

Each illustration is enclosed in a rectangle carefully drawn with red ink. All the writing is very clear and distinct, and all of the plates and the manuscript appear as clean and fresh as though they had been made recently. The facsimile (p. 303) of the "Memorandum" in vol. IV is a good example of the handwriting of the author:

MEMORANDUM

In this and the three preceding Volumes, the Objects (one Hundred and Eighty two species) which are exhibited in about five Hundred figures, were all gathered in their native places of growth by me, or sent by my Friends when newly gathered, and every figure drawn immediately from those Objects by my own hands.

There are many species of English Fungii mentioned by Authors, which are not here figured, and yet may possibly some of them grow near me, tho I have not discovered them in my researches, which have been now regularly pursued for more than twenty years;—I shall go on in the inquiry as long as Health and strength permit, and such as I may have the good fortune to meet with I will take care to add to your Lordships store; For my desire is to acquit myself as propperly and faithfully as I can to all those whose Generosity enables me to follow my favourite pursuit. I am

My Lord with the truest sense of
Humility and Gratitude,
Your Lordships
most Obedient Servant
James Bolton

Halifax
Nov.r y. 3d
AD 1787.

"My Lord" referred to is the Earl of Gainsborough.

The first volume is dated 1784, and the note at the end of the sixth is dated January 5th, 1792. A comparison of the plates in the manuscript with those in the published work shows that all the species in the printed volumes are found in the manuscript volumes and also a few not published. In the manuscript the species illustrated are all on separate plates, whereas in the printed volumes several small species, sometimes four, are combined on a single plate. In the manuscript the species illustrated are arranged in the order in which they were collected and drawn. When they were transferred to the copper plates for printing they were re-arranged and re-numbered. As the author states, he made some of the drawings directly on the copper plates from fresh specimens, but he also illustrated the species in the *Icones*.

A comparison of the published plates with the manuscript shows that most of the illustrations were transferred from the manuscript plates to the copper plates for the published illustrations. Opposite each plate is a brief description or note regarding the specimen illustrated indicating where and when it was collected. In the "Advertisement" on the first page of fascicle 2 the following statement is made:

ADVERTISEMENT

The written part contains little more than a specifying of the place and time where each species was gathered, and a few remarks upon such properties relating to them as could not well be expressed by the Pencil; For when an Object in Natural History is faithfully represented by Lines and Colours, I think it quite unnecessary to accompany such a figure with a descriptive History in writing.

Halifax
Sept.r ye 20th
1786.

The following two quotations will give an idea of the character of these notes.

Fasc. 3, p. 94, opposite pl. 94, MS.:

AGARICUS RUBEUS, HIST. 36

Red Agaric

This new and beutiful species I gathered in company with my Friend Mr. Paul Shackleton the Entimologist, in a little Wood at Shibden Hall near Halifax October ye 29th, 1786.

Gills in three series, transparent in some lights, and of a Ruby colour. Pileus looks like Pillow Fustin made of dark red Cotton. Stem tough solid crooked and near the root a little swell'd. No volva. I never met with it before or since.

Fasc. 3, p. 132, opposite pl. 132, MS. reads as follows:

SPHAERIA MORI HIST. 120. f. 1

Mulberry Sphaeria
Sph. fragiformis

This Sphaeria was brought me by Wm. Alexander M.D. a Most ingenious Botanist and steady Friend, who has accompanied me in many of my most arduous and

extensive Botanic rambles, has swormed the dreary precipices at Ingleborrow, Skiddow, y^e^ Glydar, & Criby destillh, with a spirit & Resolution *wh.* Indicates a true Botanic Genius.

The Sphaeria grew on the Bark of a fallen Maple Tree near his House in Halifax,—. I have figured it as it appeard under magnifiers of two different powers.

The dates of collection and localities given in the manuscript usually agree with those given in the published work.

It seems evident from his statement in the "Advertisement" quoted that he changed his mind in regard to the desirability of including descriptions of the species illustrated when he came to prepare the "work" for publication and also changed the title from *Icones* to *History*.

Various persons and localities are mentioned in the manuscript which are not found in the published work (as in the case of Dr Alexander and Mr Shakelton). Some of these references might possibly furnish clues which would lead to the discovery of more information in regard to the author and his work. On two blank sheets at the end of vol. IV there is evidence that two sheets of manuscript which had been pasted in have been removed. This is shown by the presence of patches of red sealing wax on the sheets and some remains of the sheets with traces of writing not in Bolton's hand. These sheets may have contained valuable information regarding the volumes but were removed by some previous owner on account of their holograph or autograph value. An appeal to the bookseller for information regarding the previous owner of the volumes gave only the statement that he bought it at a sale and knew nothing of its previous history. Perhaps some of our English colleagues, who may well be proud of their first distinguished Mycologist, will be able to pursue this subject further.

In a biographical sketch published in *The Halifax Naturalist*, vol. VI, § 36, pp. xlviii–liv, February, 1902, prepared by the editor, W. B. Crump, it is said that "It is doubtful whether the originals for the History of Fungusses are still in existence. They were probably destroyed by fire when the old hall at Exeton (the family seat) was burned in 1810." This reference is to the home of Bolton's patron, the Earl of Gainsborough. It is also stated that some other drawings which the Earl received from Bolton are now in the British Museum (Natural History). These illustrations are referred to in the above-mentioned sketch and also in Massee and Crossland's *Fungous Flora of Yorkshire*. The numbers and dates they bear indicate that they were prepared after the original manuscript had been completed and bound, and the printed work published. It would be interesting to know the history and wanderings of these manuscript volumes after they left the Library of the Earl. They contain no book plates and no inscriptions except that in vol. I there is a note in pencil "lent to Miss A.B." and on the inside of the cover in vols. II, IV and V is written in ink "Colborne

Westharling." Whoever possessed the volumes for the past hundred years or more has certainly given them excellent care.

But little seems to be known about Bolton's life and the date of his birth is uncertain. As he says on the title-page of his *History of the Fungusses of Halifax* that he was a member of the Natural History Society of Edinburgh, we thought it possible that the record of the Society might contain the date of his birth or some other information concerning him. Mr C. E. Foister, of the Department of Botany of the University of Edinburgh, has kindly searched such records as are available but can find nothing regarding Bolton.

Bolton is said to have gained his livelihood chiefly as an artist, draughtsman and teacher of drawing. He seems to have been largely self-educated and never to have had much formal instruction in Botany. He evidently spent most of his leisure during his life in the collection, study and illustration of the fungi and other plants and animals. He seems to have possessed or had access to some of the mycological works available at that time, as in the introduction to vol. II of his published work he speaks of having made use of Linnaeus, Micheli, Battarra, Sterbeeck, Gleditsch, etc. As his work was done before the appearance of the works of Persoon and Fries, it is not to be wondered at that many of his identifications were erroneous. That he recognised his limitations and that his opinions of the identity of the species changed with the lapse of time and study is clearly indicated by comparing the numerous tentative names written in pencil which were first given to the species (79 in all) illustrated in the manuscript volumes with those finally adopted in the published work and inserted by him later in the manuscript volumes. In the manuscript volume many of the species were regarded as "nondescript," but before the work was published he had decided to refer a large part of such to species already described by previous authors. He therefore went through the manuscript volumes and inserted at the top of each page the name finally adopted for publication with the citation of the plate upon which the species occurs in the published work. Water-colour artists who have examined the plates marvel at the clearness and brightness of the colours and their study will probably throw more light on the identity of some of the species which have been misunderstood or are doubtful.

INDEX TO BERKELEY AND BROOME'S "NOTICES OF BRITISH FUNGI"

By J. RAMSBOTTOM

M. J. Berkeley began the publication of the "Notices of British Fungi" in 1837, and from 1848 C. E. Broome collaborated with him. The "Notices" continued until 1885 and many mycologists have felt the need of an index; probably much information about British species has been neglected because of the labour of tracking down the references.

There is a manuscript index to the "Notices," in the Department of Botany, British Museum, evidently compiled by Berkeley and formerly in the possession of Worthington G. Smith. I decided to publish this, but on examining it with that in view found that it was very incomplete. A new index was therefore compiled. In this, subgenera and sections are given as in the "Notices" and the authorities are quoted. No attempt has been made to make these uniform, except for Berkeley and his collaborators.

As is to be expected in a series lasting over 48 years the treatment is varied. So far as this concerns numbers it has been thought best to adopt the following method:

An asterisk (*) before a number indicates duplication, shown elsewhere as *bis*.

An asterisk after a number indicates that the species is mentioned, usually as a separate item, though occasionally also when some detail is given about it: sometimes the species with an asterisk belongs to the next number but it has been thought best to adopt one method of reference. It should be pointed out that this method does not agree with that of Berkeley, who writes (1837): "New localities of the rarer species will also be inserted, and any additional information respecting such as are already recorded. These by way of distinction will be marked by an asterisk."

A (†) before a name indicates that there is an illustration.

It should be noted that some of the original diagnoses of Berkeley, and Berkeley and Broome, are not those of the "Notices." It has not been thought necessary to indicate these.

New genera are indicated by the addition of the authority.

Varieties are included only when they are given a name.

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(1) Nos. 1–37, Jardine, *Mag. Zool. & Bot.* I (1837), 42–9.
(2) 38–58, Jardine, *ibid.* I (1837), 507–13.
(3) 59–107, *Ann. Nat. Hist.* Ser. 1, I (1838), 198–208.
(4) 108–137, *ibid.* Ser. 1, I (1838), 257–64.
(5) 138–207, *Ann. & Mag. Nat. Hist.* Ser. 1, VI (1841), 355–65.
(6) 208–256, *ibid.* Ser. 1, VI (1841), 430–9.
(7) 257–322, *ibid.* Ser. 1, XIII (1844), 340–60.

BERKELEY, M. J. AND BROOME, C. E. "Notices of British Fungi"

(8) Nos. 323–379, *Ann. & Mag. Nat. Hist.* Ser. 2, II (1848), 259–68.
(9) 380–437, *ibid.* Ser. 2, V (1850), 365–80.
(10) 438–501, *ibid.* Ser. 2, V (1850), 455–66.
(11) 502–537, *ibid.* Ser. 2, VII (1851), 95–102.
(12) 538–614, *ibid.* Ser. 2, VII (1851), 176–89.
(13) 615–639, *ibid.* Ser. 2, IX (1852), 317–29.
(14) 640–661, *ibid.* Ser. 2, IX (1852), 377–87.
(15) 662–729, *ibid.* Ser. 2, XIII (1854), 396–407.
(16) 730–784, *ibid.* Ser. 2, XIII (1854), 458–69.
(17) 785–900, *ibid.* Ser. 3, III (1859), 356–77.
(18) 901–951, *ibid.* Ser. 3, VII (1861), 373–82.
(19) 952–985, *ibid.* Ser. 3, VII (1861), 449–56.
(20) 986–1037, *ibid.* Ser. 3, XV (1865), 312–22.
(21) 1038–1062, *ibid.* Ser. 3, XV (1865), 400–4.
(22) 1063–1103, *ibid.* Ser. 3, XV (1865), 444–52.
(23) 1104–1143, *ibid.* Ser. 3, XVIII (1866), 51–6.
(24) 1144–1181, *ibid.* Ser. 3, XVIII (1866), 121–9.
(25) 1182–1262, *ibid.* Ser. 4, VI (1870), 461–9.
(26) 1263–1334, *ibid.* Ser. 4, VII (1871), 425–36.
(27) 1335–1401, *ibid.* Ser. 4, XI (1873), 339–49.
(28) 1402–1500, *ibid.* Ser. 4, XV (1875), 28–41.
(29) 1501–1630, *ibid.* Ser. 4, XVII (1876), 129–45.
(30) 1631–1730, *ibid.* Ser. 5, I (1878), 17–30.
(31) 1731–1832, *ibid.* Ser. 5, III (1879), 202–12.
(32) 1833–1926, *ibid.* Ser. 5, VII (1881), 123–31.
(33) 1927–1988, *ibid.* Ser. 5, IX (1882), 176–83.
(34) 1989–2027, *ibid.* Ser. 5, XII (1883), 370–4.
(35) 2028–2050, *ibid.* Ser. 5, XV (1885), 342–5.

Abrothallus
Welwitschii Mont. 776
Acalyptospora
nervisequia Desm. 1043
Acremonium
†ranigenum B. & Br. 1319
Acrospeira B. & Br.
mirabilis B. & Br. 952
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graminum Libert 164
Acrothecium
†delicatulum B. & Br. 1055
†simplex B. & Br. 950
Actidium
Hysterioides Fr. 1092
Aecidium
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berberidis P. 1469*
Galii Pers. 490
incarceratum B. & Br. 1469
Pedicularis Loboschutz 254
scrophulariae De C. 1469*
Thesii Desv. 1048
Aegerita
†candida Pers. 823, 1714*
Agaricus
(Omphalia) abhorrens, B. & Br. 1751, 1853
(Naucoria) abstrusus Fr. 1871
(Tricholoma) acerbus Bull. 668, 1194
(Pleurotus) acerinus Fr. 2000
(Pleurotus) acerosus Fr. 673
(Acetabularia) acetabulosus Sow. 1859
(Panaeolus) acuminatus Fr. 1258
(Mycena) adonis Bull. 1849
(Leptonia) aethiops Fr. 1649, 1857
(Mycena) aetites Fr. 1411
(Omphalia) affricatus Fr. 994, 1999
(Clitocybe) aggregatus Schaeff. 1735
(Psilocybe) agnarius Fr. 1257
(Psalliota) albocyaneus Fr. 793
(Galera) aleuriatus Fr. 1123
(Flammula) alnicola Fr. 1242
(Crepidotus) alveolus Lasch 685
(Clitocybe) amarella Fr. 1638
(Clitocybe) amarus Fr. 1842
(Collybia) ambustus Fr. 1409
(Entoloma) ameides B. & Br. 999
(Tricholoma) amethystinus Scop. 1733
(Lepiota) amianthinus Scop. var. Broadwoodiae B. & Br. 1730*
(Mycena) amictus Fr. 1642
(Mycena) ammoniacus Fr. 1214
(Psilocybe) ammophilus Mont. & Dur. 1661
(Clitocybe) angustissimus Fr. 1407
(Galera) antipus Lasch 1251
(Flammula) apicreus Fr. 1529, 1945

Agaricus (*cont.*)
(Hypholoma) appendiculatus Bull. var. lanatus B. & Br. 1876
(Crepidotus) applanatus Pers. 2006
(Collybia) aquosus Bull. 1340
(Leptonia) asprellus Fr. 2003
(Flammula) astragalinus Fr. 1944
(Collybia) atratus Fr. 671
(Eccilia) atrides Fr. 1858
(Pleurotus) atrocaeruleus Fr. 674
(Tricholoma) atrocinereus P. 1992
(Mycena) atro-cyaneus Batsch 1213, 1640*
(Psilocybe) atro-rufus Schaeff. 1770
(Mycena) aurantio-marginatus Fr. 1516
(Armillaria) aurantius Schaeff. 1335
(Pholiota) aurivellus Batsch 680*
(Naucoria) autochthonus B. & Br. 1121
† (Nolanea) Babingtonii Blox. 680, 903*
(Lepiota) Badhami B. & Br. 664
(Naucoria) badipes Fr. 1764
†balaninus Berk. 42
(Entoloma) Batschianus Fr. 1936
†Belliae Johnst. 143
(Lepiota) biornatus B. & Br. 1633
blandus Berk. 260
(Entoloma) Bloxami B. & Br. 677
bolaris Pers. 69
(Inocybe) Bongardi Fr. 1940*
(Hebeloma) Bongardii Weinm. 1417
(Tricholoma) brevipes Fr. 1195
(Clitocybe) brumalis Fr. 1203
(Omphalia) buccinalis Sow. 1930*
(Lepiota) Bucknalli B. & Br. 1836
(Tricholoma) bufonius Fr. 786, 2027*
(Entoloma) bulbigenus B. & Br. 1937
(Armillaria) bulbiger A. & S. 1501
(Omphalia) bullula Brig. 1753
(Crepidotus) Byssisedus P. 686
(Tricholoma) caelatus Fr. 1192
(Nolanea) caelestinus Fr. 1416
(Inocybe) caesariatus Fr. 1941
(Inocybe) calamistratus Fr. 1234
(Psathyrella) caliginosus Jungh. 1540
(Crepidotus) calolepis Fr. 1765
calopus P. 266
calyptraeformis Berk. 63
(Psalliota) campestris L. var. villaticus Brond. 1533*
(Clitophilus) cancrinus Fr. 1115
(Pholiota) caperatus P. var. macropus Fr. 1939*
(Pholiota) capistratus Cooke 1003
(Hebeloma) capniocephalus Bull. 1763
(Hypholoma) capnoides Fr. *913
(Stropharia) caput-medusae Fr. 1536
(Flammula) carbonarius Fr. 1120
†(Eccilia) carneo-griseus B. & Br. 1001
carneo-tomentosus Batsch 269
(Naucoria) carpophilus Fr. 910
(Inocybe) carptus Fr. 1655
(Hypholoma) cascus Fr. 1537, 1950*
(Psathyrella) caudatus Fr. 1261
(Amanita) Ceciliae B. & Br. 663
centunculus Fr. 72
(Lepiota) cepaestipes Sow. 1185*, 1500*
(Tricholoma) cerinus Pers. 1636
(Psilocybe) cernuus Müll. 795
(Naucoria) cerodes Fr. 1948
(Clitocybe) cerussatus Fr. 670
(Crepidotus) cheimonophilus B. & Br. 687
(Psilocybe) chondrodermus B. & Br. 1538
chrysodon Batsch 258
(Inocybe) cincinnatus Fr. 1654
(Tricholoma) cinerascens Bull. 787
(Lepiota) cinnabarinus Fr. 1402
cinnamomeus d. croceus Fr. *49
(Pleurotus) circinatus Fr. 1220
(Mycena) citrinellus Pers. 1215
(Tricholoma) civilis Fr. 1507
(Hebeloma) Clarkii B. & Br. 1345
(Mycena) clavicularis Fr. 1749
†(Psilocybe) clivensis B. & Br. 916
(Collybia) clusilis Fr. b. minor. 1211
(Lepiota) clypeolaris Fr. 1183*
(Mycena) cohaerens A. & S. 1212, 1929*
(Mycena) collariatus Fr. 1520
(Collybia) collinus Scop. 1206
(Tricholoma) colossus Fr. 1190
Columbetta Fr. 259
†(Psilocybe) comptulus B. & Br. 917, 1874
(Clitocybe) concavus Scop. 1512
conchatus Bull. 67
(Pholiota) confragosus Fr. 1232
(Flammula) conissans Fr. 1243
(Psathyra) conopileus Fr. 2010
(Naucoria) conspersus Pers. 911
(Psilocybe) coprophilus Bull. 689
(Collybia) coracinus Fr. 1207
(Psathyra) corrugis P. 1952* b. gracilis Fr. 1126*
(Pleurotus) corticatus Fr. 995
cossus Sow. 40
(Entoloma) costatus Fr. 679
(Pleurotus) craspedius Fr. 1219
(Tricholoma) crassifolius Berk. 1503*
(Psathyrella) crenatus Fr. 2013
cretaceus Fr. 148
(Clitopilus) cretatus B. & Br. 903
(Lepiota) cristatus 1926*
(Naucoria) crobulus Fr. 1249
(Mycena) crocatus Schrad. 672
(Mycena) cruentus Fr. 992
(Clitocybe) cryptarum Letellier 1844
(Tubaria) cupularis Bull. 1657
(Pholiota) curvipes Fr. 1864
(Clitocybe) cyanophaeus Fr. var. Pengellei B. & Br. 1993
cyanus Pers. 68
†cyphelliformis Berk. 49
(Mycena) debilis Fr. 1521
(Clitocybe) decastes Fr. 1845
(Flammula) decipiens Smith 1241
decolorans Fr. 60
(Hebeloma) deglubens Fr. 1117

Agaricus (*cont.*)
(Lepiota) delicatus Fr. 1186
(Armillaria) denigritus Fr. 1187
depluens Batsch 73, 1949*
(Inocybe) descissus Fr. 1526
(Inocybe) destrictus Fr. 1866
(Clitocybe) diatretus Fr. 1406
(Omphalia) directus B. & Br. 1931
(Hypholoma) dispersus Fr. 794
(Pholiota) dissimulans B. & Br. 1940
(Collybia) distortus Fr. 1205
(Inocybe) dulcamarus Pers. 1653
durus Fr. 327
echinatus Roth 147
(Clitocybe) ectypus Fr. 1204
(Hypholoma) egenulus B. & Br. 915
(Hypholoma) elaeodes Fr. 1419
(Hebeloma) elatus Batsch 1238
elixus Sow. 264
(Entoloma) elodes Fr. 790
(Psalliota) elvensis B. & Br. 1009
(Tubaria) embolus Fr. 2036
(Psathyrella) empyreumaticus B. & Br. 1262
(Crepidotus) epibryus Fr. 1766
(Crepidotus) epigaeus Pers. 1949
(Hypholoma) epixanthus Fr. 914
(Tricholoma) equestris L. 665
(Pholiota) erebius Fr. 1860
ericaeus Pers. 149
(Clitocybe) ericetorum Fr. 1338
(Lepiota) ermineus Fr. 1184
erubescens Fr. 39
erythropus Pers. 65
(Naucoria) escharoides Fr. 1122
(Leptonia) euchrous Fr. 791
(Pleurotus) euosmos Huss. 328
†(Hebeloma) euthelus B. & Br. 1004
(Mycena) excisus Lasch 1517, 1930
(Clitocybe) expallens Fr. 1511
(Collybia) exsculptus Fr. 1109
(Hebeloma) fastibilis Fr. 905, 2004*
(Psathyra) fatuus Fr. 2041
(Pleurotus) fimbriatus Bolt. 672*
(Panaeolus) fimicola Fr. 1259
(Hebeloma) firmus Pers. 1236, 1531, 1869, 1942*
(Flammula) flavidus Schaeff. 330, 792*
(Mycena) flavo-albus Fr. 989
†(Flammula) floccifer B. & Br. 909
(Inocybe) flocculosus Berk. 1940*
(Pleurotus) fluxilis Fr. 1756
(Armillaria) focalis Fr. 1837
(Lepiota) Friesii Lasch 1105
(Entoloma) frumentaceus Bull. 678
(Nolanea) fulvo-strigosus B. & Br. 1650
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(Clitocybe) fumosus Pers. 2027*
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(Inocybe) geophyllus var. lateritius 1234*
(Clitocybe) giganteus Fr. 987
(Clitocybe) gilvus P. 265, 1508
(Psathyra) glareosa B. & Br. 2011
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(Lepiota) gliodermus Fr. 785, 1634*
†(Psathyra) Gordoni B. & Br. 922, 1661*
(Psathyra) gossipinus Bull. 1953
(Omphalia) gracillimus Weinm. 1112
(Naucoria) graminicola Nees 1532
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(Lepiota) granulosus Batsch var. rufescens B. & Br. 1834
(Entoloma) griseo-cyaneus Fr. 1113
(Eccilia) griseo-rubellus Fr. 2004
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(Flammula) gummosus Lasch 1119
(Tricholoma) guttatus Schaeff. 1839
(Flammula) gymnopodius Fr. 2032
(Armillaria) haematites B. & Br. 1635
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(Psalliota) haemorrhoidarius Schulz. 1534
(Naucoria) hamadryas Fr. 1870
(Collybia) hariolorum Bull. 1740
(Crepidotus) haustellaris Fr. 2007
(Psilocybe) hebes Fr. 1932
(Psathyra) helobius Kalchb. 2039
(Flammula) helomorphus Fr. 1239
Helvelloides Bull. 324
(Pholiota) heteroclitus Fr. 1230
(Mycena) hiemalis Osbeck 993
(Clitocybe) hirneolus Fr. 1841
(Lepiota) hispidus Lasch 901
(Hebeloma) hiulcus Fr. 1118
(Lepiota) holosericeus Fr. 1185
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(Flammula) hybridus Fr. 1243*
(Omphalia) hydrogrammus Fr. 1643, 1850
(Hypholoma) hydrophilus Bull. 1126
(Psilocybe) hygrophilus Fr. 1771
(Pleurotus) hypnophilus Fr. 2002
(Nolanea) icterinus Fr. 1415
(Lepiota) illinitus Fr. 1990
(Tricholoma) inamaenus Fr. 1733*
(Pholiota) inauratus Sm. 2031
(Clitocybe) incilis Fr. 1929
(Nolanea) infula Fr. 1760
(Omphalia) infumatus B. & Br. 1851
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(Stropharia) inunctus Fr. 1229, 1875
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(Hypholoma) lacrymabundus Fr. 1254*, 1950
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(Tricholoma) lascivus Fr. 1403*
(Pleurotus) laurocerasi B. & Br. 1854
(Collybia) laxipes Fr. 2028
(Leptonia) lazulinus Fr. 1227
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(Amanita) lenticularis Lasch 1104
(Pholiota) leochromus Cooke 1002
(Mycena) leptocephalus Pers. 1747
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(Hypholoma) leucotephrus B. & Br. 1256
(Lepiota) licmophorus B. & Br. 1989
(Pleurotus) lignatilis Pers. 996
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(Entoloma) lividus Fr. 1935
(Tricholoma) lixivius Fr. 1197, 1840*
(Tricholoma) loricatus Fr. 1503
(Flammula) lubricus Fr. 1245
(Hebeloma) lucifugus Fr. 792
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(Naucoria) lugubris Fr. 1945 *bis*
(Flammula) lupinus Fr. 1528
(Collybia) macilentus Fr. 1848
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(Hebeloma) magnimamma Fr. 2005
(Entoloma) majalis Fr. 998
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(Inocybe) maritimus Fr. 1525
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(Naucoria) melinoides Fr. 1946
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(Clitocybe) membranaceus Fl. Dan. 1201
(Psalliota) merdarius Fr. 1255, 1350
†(Pholiota) mesodactylius B. & Br. 329
(Lepiota) mesomorphus Bull. 1731
(Hebeloma) mesophaeus Pers. 908, 1867
(Mycena) metatus Fr. 1519, 1997
†(Lepiota) metulaespora B. & Br. 1182
(Psathyra) microrhizus Lasch 1955
(Tricholoma) militaris Lasch 1506
(Galera) minutus Quélet 1656*, 2037
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(Flammula) mixtus Fr. 1239 *bis*
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(Collybia) murinus Batsch 1210
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(Collybia) muscigenus Schm. 1408
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(Pleurotus) mutilus Fr. 1221, 1647*
(Pholiota) Mycenoides Fr. 681
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(Clitocybe) nigrescens Lasch 1199
(Collybia) nitellinus Fr. 1742
(Amanita) nitidus Fr. 1833
(Psathyra) nolitangere Fr. 1954
(Psilocybe) nucisedus Fr. 1539
(Hebeloma) nudipes Fr. 1868
(Collybia) nummularius Bull. 1743
(Hebeloma) obscurus P. 682
(Clitocybe) obsoletus Batsch 1738, 1929*
(Psalliota) obturatus Fr. 1253
(Psathyra) obtusatus Fr. 918
(Collybia) oedematopus Schaeff. 1995
(Omphalia) offuciatus Fr. 1852
(Pholiota) ombrophilus Fr. 1861
(Clitocybe) orbatus Fr. *1200
(Tricholoma) oreinus Fr. 1991
(Galera) ovalis Fr. 1250
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(Collybia) ozes Fr. 1996
(Tricholoma) paedidus Fr. 1405
(Pleurotus) palmatus Bull. 1855
(Galera) paludosus Fr. 1125
(Tricholoma) panaeolus Fr. 1404
(Pleurotus) pantoleucus Fr. 1932
(Mycena) parabolicus Fr. 1640*
(Clitocybe) parilis Fr. 1202
(Pluteus) parvulus Weinm. 1413*
(Clitocybe) pausiacus Fr. 1737
(Naucoria) Pediades Fr. 683
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(Mycena) pelliculosus Fr. 788, 1110*
(Psathyra) pellospermus Bull. 2012
(Psathyra) pennatus Fr. 1010
(Stropharia) Percivali B. & Br. 1767
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(Tricholoma) pessundatus Fr. 1189, 1336
(Pleurotus) petalodes Bull. 1223
†petasatus Fr. 271
(Inocybe) phaeocephalus Bull. 1233, 1760*
(Panaeolus) Phalaenarum Fr. 796
(Crepidotus) Phillipsii B. & Br. 1658
(Omphalia) philonotis Lasch 1412
(Pluteus) phlebophorus Ditm. 676*
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(Psilocybe) Physaloides Bull. 690
(Nolanea) piceus Kalchb. 2029
(Flammula) picreus Fr. 1244
(Pleurotus) pictus Fr. 1647
(Hypholoma) pilulaeformis Bull. 1951
(Clitocybe) pithyophilus Fr. 1107, 1843
(Entoloma) Placenta Batsch 789, 1413*
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(Collybia) plexipes Fr. 1209
(Mycena) plicato-crenatus Fr. 1748
(Mycena) plicosus Fr. 1641

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(Clitophilus) popinalis Fr. 1114
(Tricholoma) porphyroleucus Fr. 1928
(Pleurotus) porrigens P. 1222
(Tricholoma) portentosus Fr. 666
(Tricholoma) pravus Lasch 1191
(Psathyrella) pronus Fr. 924
(Collybia) protractus Fr. 1110
(Mycena) psammicola B. & Br. 1518
(Omphalia) pseudo-androsaceus Bull. 1752
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(Mycena) pullatus Berk. & Cooke 1998
(Pleurotus) pulmonarius Fr. 1522
(Hebeloma) punctatus Fr. 906
(Naucoria) pusiolus Fr. 1347, 2034
(Tricholoma) putidus Fr. 1198, 2027*
(Hypholoma) pyrrotrichus 1950*
pyxidatus Bull. 144
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(Lepiota) rachodes Vitt. 257 subsp. puellaris Fr. 1632
(Crepidotus) Ralfsii B. & Br. 2008
(Lepiota) ramentacus Bull. 1184*
(Collybia) rancidus Fr. 1513
(Hebeloma) relicinus Fr. 1344
(Panaeolus) remotus Schaeff. 2040
(Pleurotus) reniformis Fr. 1648, 1755
(Inocybe) Rennyi B. & Br. 1761
(Entoloma) repandus Bull. 676*
(Tricholoma) resplendens Fr. 1337
(Entoloma) resutus Fr. 1414
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(Omphalia) retostus Fr. 1750
(Pleurotus) revolutus Kickx 1933
(Eccilia) rhodocalyx Lasch 904
(Clitocybe) rivulosus P. 1734 var. neptuneus Batsch 1994
(Armillaria) robustus A. & S. 1502
(Crepidotus) Rubi Berk. 1657*
†rubidus Berk. 3
(Galera) rubiginosus P. 1252
(Naucoria) rubricatus B. & Br. 1873
(Mycena) rubro-marginatus Fr. var. fusco-purpureus Lasch 1639
(Omphalia) rufulus B. & Br. 325
(Mycena) rugosus Fr. 990
(Omphalia) rusticus Pers. 1217 *bis*
(Pleurotus) Ruthae B. & Br. 1754
(Mycena) sacchariferus B. & Br. 1216
(Clitocybe) Sadleri Berk. 1734 *bis*
(Flammula) sapineus Fr. 1006
(Tricholoma) saponaceus Fr. 1106
(Inocybe) scabellus Fr. 1235, 1940*
(Flammula) scambus Fr. 1417*
(Tricholoma) Schumacheri Fr. 1927
(Psilocybe) scobicola B. & Br. 1769
(Stropharia) scobinaceus Fr. 1660
(Naucoria) scolecinus Fr. 1247
(Naucoria) semiflexus B. & Br. 1246
(Lepiota) seminudus Lasch 1634, 1835
semiorbicularis Bull. 274
(Collybia) semitalis Fr. 1739
†(Psathyra) semivestitus B. & Br. 920
(Hebeloma) senescens Batsch 1941 *bis*
(Clitocybe) senilis Fr. 1847
(Pleurotus) septicus Fr. 1413*
(Pleurotus) serotinus Schrad. 997
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(Naucoria) sideroides Bull. 1007, 1947
(Hypholoma) silaceus P. 1498
(Hebeloma) sinapizans Fr. 1237
(Naucoria) siparius Fr. 684
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(Naucoria) sobrius Fr. 912, 1348
(Clitocybe) socialis Fr. 1637
(Leptonia) solstitialis Fr. 1226
(Tricholoma) sordidus Fr. 1196, 1336*
(Volvaria) speciosus Fr. 5, 902*
(Pholiota) spectabilis Fr. 904*
(Entoloma) speculum Fr. 1938
(Galera) Sphagnorum Pers. 1008
(Panaeolus) sphinctrinus Fr. 1662
(Pluteus) spilopus B. & Br. 1856
(Amanita) spissus Fr. 986
(Clitocybe) splendens Fr. 1510
(Pleurotus) spongiosus Lasch 1218
(Flammula) spumosus Fr. 1240
(Tubaria) stagninus Fr. 2005 *bis*
(Tricholoma) stans Fr. 1838
stellatus Fr. 268
(Psalliota) stercorarius Fr. 688
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(Collybia) Stevensoni B. & Br. 1497
(Clitopilus) stilbocephalus B. & Br. 1758
(Collybia) stolonifer Jungh. 1744, 1848 *bis*
(Hypholoma) storea Fr. 1418
(Omphalia) striaepileus Fr. 1646
(Amanita) strobiliformis Fr. 662
(Clitocybe) subalutaceus Batsch 1509
(Psathyrella) subatratus Batsch 1260
(Panaeolus) sub-balteatus B. & Br. 923
(Armillaria) subcavus Schum. 1403
(Hebeloma) subcollariatus B. & Br. 1942
(Psilocybe) subericaeus Fr. 2009
(Psalliota) subgibbosus Fr. 2038
(Clitocybe) subinvolutus Batsch 1508*
(Hypholoma) sublateritius var. Schaefferi B. & Br. 1768
(Pholiota) subluteus Fl. Dan. 2030
(Tricholoma) subpulverulentus Pers. 669
(Pholiota) subsquarrosus Fr. 1862
(Collybia) succineus Schaeff. 1339
(Volvaria) Taylori B. & Br. 675
(Omphalia) telmaticus Cooke 1999
(Volvaria) temperatus B. & Br. 1757
(Naucoria) temulentus Fr. 1530
(Naucoria) tenax Fr. 1248, 1872
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(Lepiota) Terreii B. & Br. 1183
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(Entoloma) Thomsoni B. & Br. 1523

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(Stropharia) thraustus Kalkb. 1659
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(Mycena) tintinnabulum Fr. 1746
(Clitocybe) tornatus Fr. 1200
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(Psathyrella) trepidus Fr. 1956
(Inocybe) Trinii Weinm. 1656
(Clitocybe) Trogii Fr. 1846
(Clitocybe) trullaeformis Fr. 1108
(Hebeloma) truncatus Fr. 1346
(Clitocybe) tuba Fr. 1736
(Pholiota) tuberculosus Fr. 1863
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(Tricholoma) tumidus P. 1840
(Collybia) tylicolor Fr. 1341
(Pleurotus) ulmarius Bull. 1853*
(Omphalia) umbelliferus L. 267 var. abiegnus B. & Br. 1413 var. viridis Fl. Dan. 1749*
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(Hebeloma) vatricosus Fr. 1005
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(Collybia) ventricosus Bull. 1514, 1741
(Nolanea) verecundus Fr. 1228
(Pholiota) verruculosus Lasch 1939
(Hebeloma) versipellis Fr. 907
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(Flammula) vinosus Bull. 1943
(Tricholoma) virgatus Fr. 1504
(Mycena) vitreus Fr. 1111
(Galera) vittaeformis Fr. 1535, 2035
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†glabrum Berk. 1397*
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†(Mollisea) aquosa B. & Br. 1326
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†(Helvelloideae) bufonia P. 1154
†(Mollisia) Bullii Sm. 1324
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(Hymenoscyphae) Candolleana Lév. 1723
†(Geopyxis) carbonaria Alb. & Schw. 1063
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†(Mollisia) elaphines B. & Br. 1325
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(Dasyscyphae) fuscescens P. 1622
(Humaria) fusispora Berk. var. scotica Berk. 1481
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†(Humaria) haemastigma Fr. 1159
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†(Mollisia) hepatica Batsch 1069
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†(Humaria) humosa Fr. 768*, 1156*
†(Mollisia) hydnicola B. & Br. 1327
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†(Sarcoscyphae) lanuginosa Bull. var. Sumneri B. & Br. 1161
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(Anodermei) alutaceus Fr. 1799
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(Resupinati) bathyporus Rostkovius 357, 1807
(Resupinata) blepharistoma B. & Br. 1434
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(Anodermei) cuticularis Fr. 1137
(Anodermei) epileucus Fr. 1287, 2046*
(Resupinatus) farinellus Fr. 1292
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(Inodermei) Herbergeii Rostk. 1805
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(Resupinati) hymenocystis B. & Br. 1810 *bis*
(Anodermei) Keithii B. & Br. 1430
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(Anodermei) mollis Fr. 1365
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(Pleuropus) petaloides Fr. 2023
(Inodermei) polymorphus Rostk. 1802
(Placodermei) populinus Fr. 1288
(Inodermei) pubescens Fr. 1803
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(Resupinati) radula Fr. 1808
(Resupinati) ramentaceus B. & Br. 1809
(Inodermei) ravidus Fr. 2047
(Resupinati) Rennyi B. & Br. 1433
(Resupinati) reticulatus P. 1891
(Resupinati) reticulatus Weinm. 1810
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(Placodermei) roseus Fr. 1801
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(Resupinati) violaceus Fr. 1021
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†(Obtectae) aucta B. & Br. 628
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†(Caespitosae) barbula B. & Br. 870
†(Subtectae) blepharodes B. & Br. 978
†(Pertusae) brachythele B. & Br. 877
†(Denudatae) brassicae Klotzsch 1333*
†(Foliicolae) Brassicae (Chev.) 656*
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†(Caulicolae) Clivensis B. & Br. 643
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†(Caulicolae) commanipula B. & Br. 645
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†(Foliicolae) eucrypta B. & Br. 652
†(Platystomae) excipuliformis Fr. 880
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†(Obtectae) farcta B. & Br. 631
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†(Villosae) felina Fuck. 1332
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(Denudatae) fimicola Roberge 1097
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(Incusae) angulata Fr. 848*
(Obvallatae) biconica Curr. 857

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†(Circinatae) bitorulosa B. & Br. 861
†(Circinatae) chrysostroma Fr. 861*
(Incusae) concamerata Curr. 867
(Circumscriptae) Crataegi Curr. 848, 1986
(Incusae) dryina Curr. 850
(Circinatae) faginea Curr. 864
†(Obvallatae) fenestrata B. & Br. 853
†(Circinatae) hypodermia Fr. 862*
(Circinatae) Innesii Curr. 863
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†(Obvallatae) Plantanigera B. & Br. 851
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†(Incusae) taleola Fr. 849
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SOME EFFECTS OF *BOTRYTIS CINEREA* ON ROSES

By G. EDWARD DEACON

(With Plate XV)

During the past two or three years there has been an enormous increase of die-back in roses.

In rose nurseries and in private gardens, last December (1931), I noticed that on a very large proportion of the wood killed by die-back a fungus was beginning to grow, and to the naked eye, this fungus seemed to be always the same. I sent some of the wood with the fungus to Dr Dillon Weston, of the School of Agriculture, Cambridge, who identified it as *Botrytis cinerea*. He made a pure culture from it, sent me some, and suggested that I should inoculate healthy rose plants with it to see if it would produce a die-back similar to that which we were experiencing. I received the culture on February 26th, and on the following day inoculated nine different varieties of roses, mostly two plants of each, and in addition had control plants. The plants used were quite healthy, in pots, and of 1 year's growth. I slightly pruned them, applied Brook's paste to the cut surfaces, washed the stems with 2 per cent. formalin solution, and placed them under glass where they would be separate from other plants. The plants were then inoculated by making a small incision in the bark, and applying some of the fungus to the wound. The control plants were treated in exactly the same way except that no fungus was applied to their wounds. All wounds were kept covered for several days. The temperature of the house was kept between 40 and 50° F. The plants were well syringed with water every day, but the atmosphere was not kept abnormally moist. On the twenty-first day after inoculation, wounds were uncovered and the plants examined.

All control plants were growing well, and the wounds remained perfectly healthy.

Of the inoculated plants, two strong-growing varieties—Mdlle Stella Mallerin and G. A. Hammond—had made vigorous growth and were apparently unaffected by the inoculation, except that the edges of the wounds were rounded and somewhat thickened when compared with the control plants. In all the other inoculated plants there was evidence of die-back of a varying degree. In a few specimens dead bark extended from the wound for only a quarter of the circumference of the stem, and for about an inch in an upward direction. In three plants the bark was dead all round the stem, and the entire stem above inoculation was wilting.

The more severe effects showed well-marked rings round the

wounds, as seen in Fig. 1. On one inoculated plant, mycelium and conidia of *Botrytis cinerea* were growing on a thorn scar, just above the wound, 21 days after inoculation. There was never any extension of die-back after the fourth week; all plants were then growing satisfactorily, apart from the previously affected shoots. Where the die-back was at all extensive the spreading downwards invariably stopped at the next active node. The dead bark was always of a uniform dark brown without any trace of red or purple.

In order to show how roses become infected with *Botrytis cinerea* by natural means, one of the inoculated plants, which was at the time producing an abundance of spores, was placed in a glass-house where healthy pot roses were coming into bloom for the second time in the season. The plants were frequently syringed with water in order to produce a moist atmosphere similar to that of late autumn, when die-back of roses mainly occurs. Some of the blooms, as they faded, were allowed to remain on the plants, and others were removed by cutting through the stem midway between the nodes to leave a "snag." This was done to simulate the conditions which occur where roses are grown on a large scale.

Towards the end of the second week aphides and rose mildew made their appearance on the plants—insecticides and fungicides had been discontinued.

During the third week a grey fungus appeared on (1) snags left where blooms had been removed, as Fig. 2; (2) the anthers and petals of faded blooms; (3) petals of some unexpanded blooms. This fungus showed a dark septate mycelium with the conidial fructifications of *Botrytis*. The bark of some rapidly growing shoots showed brown spots, which spread very quickly, and soon caused wilting. Sometimes these spots began at an obvious injury.

During the fourth week some thorns of a rapidly growing plant of Mrs A. R. Barraclough—a variety particularly subject to die-back—were noticed to have become dark brown. This discoloration rapidly spread to the surrounding bark, upon which *Botrytis* soon appeared, as shown in Fig. 3. When these thorns first became discoloured they were quite firm and no injury could be detected, although a few days later other thorns of this plant became coated with mycelial pads of *Sphaerotheca pannosa*, but none appeared on the dark brown thorns.

Syringing was now discontinued, and, with the aid of the bright sun, the atmosphere of the house was allowed to become rather dry.

Although an abundance of *Botrytis* spores and mycelium persisted on faded blooms and bark, the disease became stationary, and during the next 4 weeks, while the atmosphere was kept dry, no fresh activity of the disease was detected.

From these experiments it appears *Botrytis cinerea* is able to produce severe die-back in roses, even when the plant is beginning active

Fig. 1.

Fig. 2.

Fig. 3.

growth. At the end of the fourth week the plants were growing strongly and the disease then ceased to spread.

Mycelium and conidia of the disease appeared on a thorn scar 21 days after inoculation.

Where two plants of a variety were inoculated, the effects varied.

The activity of the disease appeared to be influenced very much by the degree of humidity of the atmosphere. Soft, rapidly growing shoots were readily infected, and in these the disease spread very quickly.

When the infected parts were completely cut out and the plant placed under healthy conditions it grew satisfactorily and seemed little the worse for the infection.

I am very much indebted to Dr Dillon Weston for suggesting these experiments, and for the many ways in which he has helped me.

EXPLANATION OF PLATE XV

Fig. 1. Rose "Heinrich Eggers," 23 days after inoculation. Rings have formed at the point of inoculation, the bark has died and the shoot has wilted.
Fig. 2. Fungus on an infected "snag."
Fig. 3. Shows fungus spreading round thorns and killing bark.

NOTE

THE GERMINATION OF THE SPORES OF *MERULIUS LACRYMANS* (WULF.) FR.

(With 1 Text-figure)

THERE has been considerable discussion concerning the conditions required for the germination of *Merulius lacrymans* spores, and as far as can be ascertained their germination in this country has not been reported, and so it may be of interest to record the means by which vigorous germination has been secured.

The earlier workers, including Brefeld, failed to obtain germination, and it was not till 1884 that Hartig stated that he had succeeded in germinating the spores by adding ammonium compounds to the medium; both he and Poleck concluding that an alkali medium is necessary.

Möller, however (*Hedwigia*, XLII (1903), 13), using fresh spores secured ready germination in malt extract to which citric or phosphoric acid had been added, and also stated that the addition of ammonium phosphate was particularly favourable. He obtained no germination in 1 per cent. potassium carbonate or in pure water, and came to the conclusion that acidity of the medium is the most important factor in bringing about germination. His results were further confirmed by Falck (*Hausschwammforschungen*, III (1912)), who found that malic acid was equally as efficient as phosphoric. Falck gives the following concentrations of acids as optimal for inducing germination of *Merulius* spores: sulphuric 0·001 per cent., hydrochloric 0·06 per cent., phosphoric 0·2 per cent., citric 5·0 per cent., tartaric 5 per cent. and malic 5 per cent. He concluded that it is the dissociated H-ions which give the stimulus to germination. The effect rises with increasing concentrations up to a point from which it falls to total inhibition.

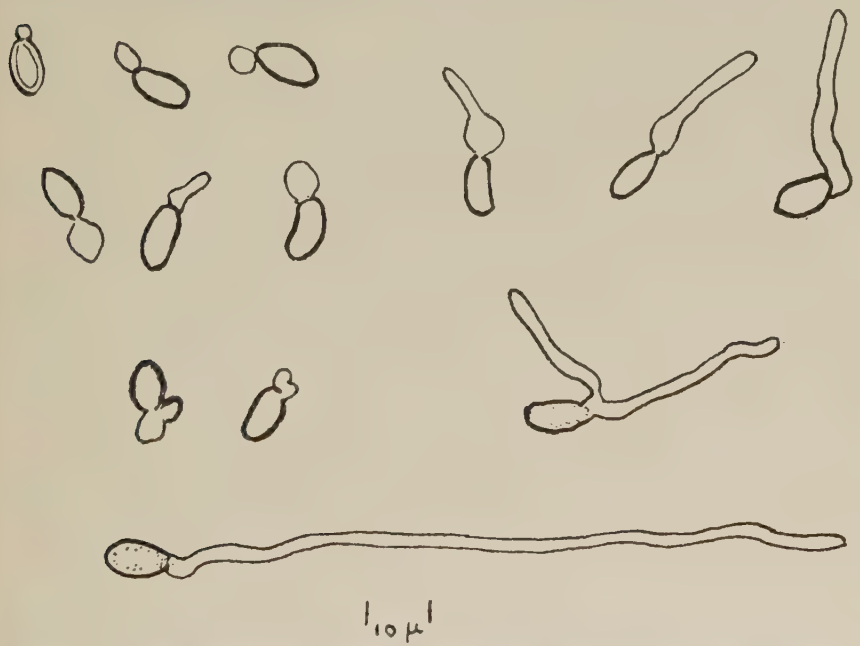
In the present instance fresh spores of *Merulius* were collected on slides from pieces of a sporophore which had developed in the laboratory. Wood on which the fungus had been growing actively had been removed from a building and allowed to dry out in the open for some weeks before it was brought into the laboratory. It was soaked overnight in water, placed in glass dishes, and the sporophores developed in a few weeks.

Cultures of the fresh spores were set up on various media in Van Tieghem cells. No germination was observed in distilled water, malt agar or prune agar or in malt agar plus 1/250 potassium hydroxide. But after six days at laboratory temperature (*circa* 20° C.) a number of spores were seen to be germinating on 8 per cent. malt agar plus 1 per cent. malic acid or 1 per cent. phosphoric acid; germination was delayed in many, but finally, when overgrowth of mycelium prevented

further observation, approximately a quarter of the spores present had germinated.

Germination of the spores also occurred on a medium made up of an old autoclaved culture of *Coniophora cerebella* mixed with fresh malt agar; this had a distinctly acidic reaction.

The first sign of germination is the protrusion of a small spherical bladder-like swelling from one end of the spore. This grows larger and then grows out into a germ tube generally of smaller diameter than the swelling—occasionally there are two germ tubes, but both come from the



Text-fig. 1. Spores of *Merulius lacrymans* in various stages of germination after 6 days at about 20° C. upon 8 per cent. malt extract agar plus 1 per cent. phosphoric acid.

same swelling. Growth of the germ tube and of the primary mycelium is slow. The first stages of germination are illustrated in Text-fig. 1.

Some samples of wood treated in various ways and then sterilised by steaming were also infected with spores. No germination upon any of the blocks treated with acids was observed, but a few spores germinated on untreated Sitka spruce and beech.

Falck has stated that *Merulius* spores may be capable of germination after periods of up to five years' storage in the laboratory, but it is probable that as the spore gets older, germination is increasingly difficult and requires a longer period of incubation. The difficulties experienced by some workers are no doubt due to the fact that they have worked with spores which were no longer fresh.

W. P. K. FINDLAY.

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80. Cooper, Mrs V. Astley, Clerdoun, Epsom Road, Ewell, Surrey. (1921.)
81. Cornell University, The Library, New York State College of Agriculture, Ithaca, N.Y., U.S.A. (1920.)
82. Corner, Mr E. J. H., B.A., F.L.S., Assistant Director, Botanic Garden, Singapore, Straits Settlements. (1924.)

83. Cotton, Mr Arthur D., F.L.S., Keeper, Herbarium, Royal Botanic Gardens, Kew, Surrey. (1902.)
84. Cunningham, Mr G. H., Ph.D., Plant Research Station, Box 240, Palmerston North, New Zealand. (1922.)
85. Curtis, Miss Kathleen M., M.A., D.Sc., D.I.C., F.L.S., Mycologist, Biological Department, Cawthron Institute of Scientific Research, Nelson, New Zealand. (1917.)
86. Cutting, Mr E. M., M.A., F.L.S., Botanical Department, University College, Gower Street, London, W.C. 1. (1920.)
87. Dade, Mr H. A., A.R.C.S., Department of Agriculture, Aburi, Gold Coast, West Africa. (1927.)
88. Darbishire, Professor O. V., B.A., Ph.D., F.L.S., The University, Bristol. (1913.)
89. Das, Mr Kedarnath, C.I.E., M.D., Principal, Carmichael Medical College, 1, Belgachia Road, Calcutta, India. (1922.)
90. Davies, Mr D. W., B.Sc., Adviser in Mycology, Agricultural Buildings, University College of Wales, Aberystwyth. (1923.)
91. Davis, Mr J. Jefferson, B.S., M.D., University of Wisconsin, Madison, Wis., U.S.A. (1921.)
92. Day, Mr E. Metcalfe, Rowan Cottage, Minchinhampton, Glos. (1921.)
93. Day, Mr W. R., B.A., B.Sc., Imperial Forestry Institute, Oxford. (1928.)
94. Dehra Dun, The Forest Botanist, Forest Research Institute and College, U.P., India. (1929.)
95. Deighton, Mr F. C., M.A., Mycologist, Department of Lands and Forests, Freetown, Sierra Leone, West Africa. (1925.)
96. Dennis, Mr R. W. G., West of Scotland Agricultural College, 6, Blythswood Square, Glasgow. (1932.)
97. Dickinson, Mr S., Botanical Department, University College, Cardiff, S. Wales. (1921.)
98. Dickson, Mr B. T., B.A., Ph.D., Senior Mycologist, Council for Scientific and Industrial Research, 314, Albert Street, East Melbourne, Australia. (1923.)
99. Dodge, Dr Carroll W., Missouri Botanical Garden, 2315, Tower Grove Avenue, St Louis, Missouri, U.S.A. (1926.)
100. Dowson, Mr W. J., M.A., D.Sc., The Botany School, Cambridge. (1920.)
101. Duncan, Mr J. T., London School of Hygiene and Tropical Medicine, Keppel Street, London, W.C. 1. (1930.)
102. Edwards, Mr W. H., Belle Vue, Barline, Beer, Devon. (1896.)
103. Elliott, Mr W. T., D.D.S., L.D.S., F.L.S., F.Z.S., Arden Grange, Tanworth-in-Arden, Warwickshire. (1913.)

104. Elliott, Mrs J. S. Bayliss, D.Sc. (B'ham), B.Sc. (Lond.), Arden Grange, Tanworth-in-Arden, Warwickshire. (1911.)
105. Ellis, Mr E. H., B.Sc., Department of Botany, British Museum (Nat. Hist.), Cromwell Road, London, S.W. 7. (1924.)
106. Ellis, Miss E. M., St Hugh's College, Oxford. (1930.)
107. Ellis, Mr Holmes, F.R.M.S., 108, Birtwistle Avenue, Colne, Lancs. (1927.)
108. Emoto, Dr Y., Biological Department, Peers' College (Sakushuin), Takata-Machi, Tokyo, Japan. (1929.)
109. Engledow, Professor F. L., M.A., School of Agriculture, Cambridge. (1922.)
110. Essex Field Club, c/o Mr Percy Thompson, F.L.S., Essex Museum of Natural History, Romford Road, Stratford, London, E. 15. (1919.)
111. Eweis, Mr E. M., Botanical Department, Imperial College of Science, South Kensington, London, S.W. 7. (1932.)
112. Exeter, Librarian, University College of the South-West of England. (1926.)
113. Eyre, Miss J. C., Maitlands Cottage, Ipplepen, Newton Abbot, Devon. (1915.)
114. Faulkner, Mr F., c/o Gillanders, Arbuthnot & Co., Bombay, India. (1930.)
115. Fenton, Mr E. W., M.A., B.Sc., F.L.S., Biology Department, Edinburgh and East of Scotland College of Agriculture, Edinburgh. (1920.)
116. Fikry, Mr Amin, Plant Protection Section, Cotton Research Board, Giza, Egypt. (1927.)
117. Findlay, Mr W. P., B.Sc., A.R.C.S., Courte Falaise, Sevenoaks, Kent. (1928.)
118. Finlayson, Mr Raymond A., F.L.S., Official Seed Testing Station, Huntingdon Road, Cambridge. (1910.)
119. Fisher, Mr S. D. P., Sackville Street, Leeds. (1930.)
120. Forwood, Mr R., Wynfield, Parkgate, Cheshire. (1930.)
121. Freemantle, Mr I. S., 7, Ampton Road, Edgbaston, Birmingham. (1931.)
122. Gadd, Mr C. H., D.Sc., Tea Research Institute, Nuwara Eliya, Ceylon. (1921.)
123. Galloway, Mr L. D., 2, Milton Crescent, Cheadle, Cheshire. (1928.)
124. Gardner, Capt. Frederic, c/o Barclays Bank, Jersey, C.I. (1898.)
125. Garside, Mr S., M.Sc., F.L.S., Botanical Department, Bedford College, Regent's Park, London, N.W. 1. (1922.)
126. Gates, Professor R. R., B.Sc., Ph.D., F.R.S., F.L.S., King's College, Strand, London, W.C. 2. (1921.)

127. Gäumann, Dr E. A., Prof. f. spezielle Botanik, Universitätsstrasse 2, Zürich 6, Switzerland. (1928.)
128. Ghamrawy, Mr Ali K., Plant Pathology Department, Imperial College of Science, South Kensington, London, S.W. 7. (1932.)
129. Gilbert, M. E., Docteur en Pharmacie, 6, Rue de Laos, Paris (15e), France. (1924.)
130. Gilbert, Dr E. M., Botanical Department, University of Wisconsin, Madison, Wis., U.S.A. (1922.)
131. Gisborne, Mr J. H., Keble College, Oxford. (1932.)
132. Glasstone, Mrs V. F. C., B.A. (Oxon.), 15, Northumberland Road, Sheffield. (1930.)
133. Glynne, Miss Mary D., M.Sc., F.L.S., Rothamsted Experimental Station, Harpenden, Herts. (1932.)
134. Gorman, Mr M. J., A.R.C.Sc.I., Albert Agricultural College, Glasnevin, Dublin. (1925.)
135. Gough, Mr G. C., B.Sc., A.R.C.S., Ministry of Agriculture, Cornwall Buildings, 45, Newhall Street, Birmingham. (1923.)
136. Gould, Mr F. G., Woodrising, Trapps Hill, Loughton, Essex. (1918.)
137. Green, Col. C. Theodore, A.M.S., M.R.C.S., L.R.C.P., F.L.S., 31, Shrewsbury Road, Birkenhead. (1901.)
138. Green, Miss E., M.Sc., 15, Gower Street, London, W.C. 1. (1925.)
139. Green, Miss F. Mary, The Botany School, Cambridge. (1931.)
140. Gregor, Mrs M. J. F., Ph.D., Royal Botanic Garden, Edinburgh. (1927.)
141. Gregory, Mr P. H., Ph.D., Gordon Bell Research Laboratory, Medical College, University of Manitoba, Winnipeg, Canada. (1930.)
142. Grieve, Mr B. J., M.Sc., Botanical Department, Melbourne University, Carlton, Victoria, Australia. (1931.)
143. Grinling, Mr C. H., B.A., 71, Rectory Place, Woolwich, London, S.E. 18. (1913.)
144. Grove, Miss Jessica H., 14, The Tything, Worcester. (1927.)
145. Gwynne-Vaughan, Professor Dame Helen, G.B.E., D.Sc., LL.D., F.L.S., 93, Bedford Court Mansions, London, W.C. 1. (1906.)
146. Hall, Miss M. P., Plant Pathology Department, Imperial College of Science, South Kensington, London, S.W. 7. (1930.)
147. Hanna, Mr W. F., M.Sc., Dominion Rust Research Laboratory, Agricultural College, Winnipeg, Canada. (1925.)

148. Hansford, Mr C. G., M.A., F.L.S., Mycologist, Department of Agriculture, Kampala, Uganda. (1921.)
149. Harley, Mr J. L., 18, Oak Road, Newton Park, Leeds. (1932.)
150. Harris, Mr R. V., B.Sc., Horticultural Research Station, East Malling, Kent. (1924.)
151. Harrison, Mr T. H., B.Sc. (Agr.), Hawkesbury Agricultural College, Richmond, N.S. Wales, Australia. (1931.)
152. Harvard University, The Library, Cambridge, Mass., U.S.A. (1923.)
153. Hastings, Mr Somerville, M.S., F.R.C.S., 43, Devonshire Street, Portland Place, London, W. 1. (1913.)
154. Heim, M. Roger, Assistant au Muséum d'Histoire Naturelle, 63, Rue de Buffon, Paris (V^{e}), France. (1930.)
155. Heimbeck, Mrs Louise, Brosoe, Levanger, Norway. (1923.)
156. Hemmi, Dr Takewo, Phytopathological Institute, Department of Agriculture, Kyoto Imperial University, Kyoto, Japan. (1923.)
157. Hildyard, Mr F. W., 1, Lichfield Road, Kew, Surrey. (1913.)
158. Hiura, Professor Makoto, Gifu Imperial College of Agriculture, Naka-Mura, Gifu, Japan. (1931.)
159. Hoggan, Miss I. A., Department of Plant Pathology, University of Wisconsin, Madison, Wis., U.S.A. (1923.)
160. Holden, Professor H. S., D.Sc., F.L.S., Botanical Department, University College, Nottingham. (1923.)
161. Honolulu, Association of Hawaiian Pineapple Canners, P.O. Box 3166, Hawaii. (1929.)
162. Honolulu, The Library, Experimental Station, S.P.A., Box 411, Hawaii. (1920.)
163. Hopkins, Mr J. C. F., Agricultural Department, Salisbury, S. Rhodesia. (1930.)
164. Horne, Mr A. S., D.Sc., F.L.S., F.G.S., Botanical Department, Imperial College of Science, South Kensington, London, S.W. 7. (1921.)
165. Howard, Mr H. J., F.R.M.S., F.L.S., "Lingfield," 6, College Road, Norwich. (1918.)
166. Hughes, Mr G. C., Chesterton, Bicester, Oxon. (1898.)
167. Hughes, Mr J. S., M.A., University Observatory, Oxford. (1927.)
168. Hull, The Librarian, Botanical Department, University College. (1929.)
169. Humphrey, Mr C. J., Mycologist and Plant Pathologist, Bureau of Science, Manila, Philippine Islands. (1921.)
170. Hunter, Mrs R., B.Sc., Department of Botany, The University, Oxford. (1925.)
171. Hurrell, Mr H. E., 25, Regent Street, Great Yarmouth. (1921.)

172. Hurst, Mr C. P., Landulph Rectory, Saltash, Cornwall. (1928.)
173. Imperial College of Tropical Agriculture, Trinidad, B.W.I. (1921.)
174. Iowa, The Library, State University of Iowa, Library Annex, Iowa City, U.S.A. (1923.)
175. Iowa State College, Library, Ames, Iowa, U.S.A. (1927.)
176. Issatchenko, Professor B. L., Directeur du Jardin Botanique, Leningrad, Russia. (1923.)
177. John Crerar Library, 86, East Randolph Street, Chicago, Illinois, U.S.A. (1929.)
178. John Innes Horticultural Institute, Mostyn Road, Merton, Surrey. (1924.)
179. Johnson, Mr J. W. Haigh, M.Sc., F.I.C., F.L.S., Walton, nr Wakefield. (1919.)
180. Johnstone, Miss K. H., Ph.D., Ministry of Agriculture, 10, Whitehall Place, London, S.W. 1. (1927.)
181. Johnstone, Mr R. B., 3, Oswald Gardens, Scotstounhill, Glasgow. (1908.)
182. Jones, Mr G. H., M.A., Plant Protection Section, Ministry of Agriculture, Cairo, Egypt. (1922.)
183. Jørstad, Mr Ivar, Statsmykolog, Botanisk Museum, Oslo, Norway. (1923.)
184. Keissler, Dr Karl, Direktor d. Botanischen Abteilung, Naturhistorisches Museum, Burgring 7, Wien 1/1, Austria. (1924.)
185. Kelly, Dr Howard A., 1418, Eutaw Place, Baltimore, Md., U.S.A. (1921.)
186. Kent, Mr G. C., Wadham College, Oxford. (1932.)
187. Klika, Mr Bohumil, Hálkova 37, Prague, Vrsovice 553, Czechoslovakia. (1926.)
188. Knight, Mr H. H., M.A., The Lodge, All Saints' Villas, Cheltenham. (1914.)
189. Krieger, Mr L. C. C., Apt. 32, 1300 Massachusetts Avenue, N.W., Washington, D.C., U.S.A. (1921.)
190. Kuala Lumpur, F.M.S., The Director of Agriculture, Straits Settlements, and Federated Malay States. (1930.)
191. Lampitt, Mr L. H., D.Sc., F.I.C., Thornlea, Mount Park, Harrow, Middlesex. (1925.)
192. Leach, Mr R., B.A., Agricultural Department, Zomba, Nyasaland. (1929.)
193. Lee, Miss E. M., 55, Logan Road, Bishopston, Bristol. (1929.)
194. Leicester, The Museum, City of Leicester. (1923.)
195. Lewis, Professor F. J., D.Sc., F.L.S., University of Alberta, Edmonton, Alberta, Canada. (1924.)
196. Line, Mr James, M.A., School of Agriculture, Cambridge. (1921.)

197. Linnean Society, The, Burlington House, Piccadilly, London, W. 1. (1919.)
198. Lloyd Library, The, Cincinnati, Ohio, U.S.A. (1907.)
199. Loader, Miss F. M., Botanical Department, University College, Southampton. (1927.)
200. Lowndes, Mr A. G., M.A., F.L.S., Marlborough College, Marlborough, Wilts. (1922.)
201. Lütjeharms, Herr W. J., Assistent aan's Rijks Herbarium, Leiden, Holland. (1930.)
202. McDonald, Mr J., D.F.C., B.Sc., F.L.S., Mycologist, Department of Agriculture, Box 323, Nairobi, Kenya Colony, East Africa. (1923.)
203. Macdonald, Mr J., 25, Drumsheugh Gardens, Edinburgh. (1929.)
204. McFarland, Dr Frank T., Department of Botany, University of Kentucky, Lexington, Ky., U.S.A. (1924.)
205. Mackenzie, Miss A. D., Research Station, East Malling, Kent. (1921.)
206. McLennan, Dr Ethel I., Botanical Department, Melbourne University, Carlton, Victoria, Australia. (1926.)
207. Madras University Library, Senate House, Triplicane, Madras, South India. (1925.)
208. Maire, M. René, D.Sc., F.M.L.S., Professeur à la Faculté des Sciences de l'Université, Algiers, Algeria, N. Africa. (1907.)
209. Mandalay, Burma, The Principal, Agricultural College. (1930.)
210. Marsh, Mr R. W., M.A., Research Station, Long Ashton, Bristol. (1923.)
211. Martyn, Mr E. B., B.A., Department of Agriculture, Georgetown, British Guiana. (1927.)
212. Masefield, Mr G. B., Lee Cottage, Charlbury, Oxon. (1932.)
213. Mason, Mr E. W., M.A., M.Sc., F.L.S., Imperial Bureau of Mycology, 17, Kew Green, Kew, Surrey. (1921.)
214. Mason, Mrs E. W., Suffield House, Paradise Road, Richmond, Surrey. (1922.)
215. Mason, Mr F. A., F.R.M.S., M.S.P.A., 29, Frankland Terrace, Leeds. (1912.)
216. Matthews, Professor J. R., M.A., F.L.S., Botanical Department, The University, Reading. (1921.)
217. Mehta, Professor K. C., Ph.D., Department of Biology, Agra College, Agra, U.P., India. (1921.)
218. Metcalfe, Mr C. R., B.A., Ph.D., Jodrell Laboratory, Royal Botanic Gardens, Kew, Surrey. (1926.)
219. Meulenhoff, Dr J. S., Ruychrocklaan 30, The Hague, Holland. (1921.)

220. Michigan Agricultural College Library, East Lansing, Michigan, U.S.A. (1924.)
221. Millard, Mr W. A., D.Sc., Ph.D., The Agriculture Department, The University, Leeds. (1924.)
222. Miller, Professor J. H., B.S., M.S., Ph.D., University of Georgia, Athens, Ga., U.S.A. (1930.)
223. Missouri, The Botanical Garden, St Louis, Mo., U.S.A. (1902.)
224. Mitra, Mr M., M.Sc., Agricultural Research Institute, Pusa, Bihar and Orissa, India. (1928.)
225. Miyabe, Dr Kingo, Professor Emeritus of Botany, Hokkaido Imperial University, Sapporo, Japan. (1919.)
226. Montague, Mrs A., Penton, Crediton, N. Devon. (1898.)
227. Montana Experiment Station, Department of Botany and Bacteriology, Bozeman, Montana, U.S.A. (1930.)
228. Montreal, Canada, Faculté des Sciences, Institut Botanique, Université de Montréal. (1932.)
229. Moore, Miss E. S., Ph.D., c/o the Secretary, Department of Agriculture, P.O. Box 994, Pretoria, South Africa. (1923.)
230. Moore, Mr W. C., M.A., Ministry of Agriculture, Pathological Laboratory, Milton Road, Harpenden, Herts. (1922.)
231. Morgan, Dr G., Ashley-Hatton, Dyke Road Avenue, Brighton. (1928.)
232. Morris, Mr L. E., 15, Tenison Avenue, Cambridge. (1924.)
233. Muller, Dr H. R. A., Institut voor Plantenziekten, Buitenzorg, Java. (1932.)
234. Murphy, Professor P. A., Sc.D., A.R.C.Sc.I., M.R.I.A., Department of Plant Pathology, Albert Agricultural College, Glasnevin, Dublin, N.W. 3. (1924.)
235. Murray, Mr G. H., F.E.S., Director of Agriculture, Rabaul, New Britain, Territory of New Guinea, *via* Australia. (1921.)
236. Murrell, Major Percy J., O.B.E., F.R.M.S., "Littlecroft," Orpington, Kent. (1923.)
237. Muskett, Mr A. E., M.Sc., A.R.C.S., Queen's University, Belfast, Northern Ireland. (1923.)
238. Nannfeldt, Dr J. A., Sturegatan 11, Uppsala, Sweden. (1932.)
239. National Collection of Type Cultures, Curator, Lister Institute, Chelsea Gardens, London, S.W. 1. (1921.)
240. National Museum of Wales, Cardiff. (1924.)
241. Nattrass, Mr R. M., B.Sc. (Agric.), Ph.D., Department of Agriculture, Nicosia, Cyprus. (1925.)
242. Nebraska, The Library, University of, Lincoln, Nebr., U.S.A. (1924.)

243. Nederlandsche Mycologische Vereeniging, c/o Mr A. C. S. Schweers, Nassaulaan 17, Alkmaar, Holland. (1920.)
244. New York Botanical Garden, Bronx Park, New York, U.S.A. (1904.)
245. Nicholson, Mr W. E., F.L.S., 50, St Anne's Crescent, Lewes. (1913.)
246. Noel, Miss E. F., F.L.S., 37, Burnham Court, Queen's Road, London, W. 2. (1913.)
247. Norman, Mr L. Stafford, Konjeni Estate, Luchenza P.O., Nyasaland. (1927.)
248. North Carolina, Library, University of, Chapel Hill, North Carolina, U.S.A. (1920.)
249. Nursery and Market Garden Industries' Development Society, Ltd., Experimental and Research Station, Cheshunt, Herts. (1922.)
250. O'Connor, Mr P., Ph.D., B.Sc., A.R.C.Sc.I., National Museum, Dublin. (1925.)
251. Ogilvie, Mr L., M.A., M.Sc., Research Station, Long Ashton, nr Bristol. (1922.)
252. Oke, Mr Alfred William, B.A., F.G.S., F.L.S., 32, Denmark Road, Hove, Sussex. (1908.)
253. Ontario Agricultural College, Library, Guelph, Ontario, Canada. (1920.)
254. Osborn, Professor T. G. B., D.Sc., F.L.S., Botanical Department, The University, Sydney, N.S.W., Australia. (1910.)
255. Ottawa, Ontario, Canada, The Library, Geological Survey. (1926.)
256. Overholts, Dr L. O., Botany Department, Pennsylvania State College, Pa., U.S.A. (1929.)
257. Page, Miss W. M., M.Sc., 19, Ledam Buildings, Bourne Estate, Holborn, London, E.C. 1. (1921.)
258. Park, Mr M., Department of Agriculture, Peradeniya, Ceylon. (1929.)
259. Parke Davis & Co., Medical Research Library, P.O. Box 488, Detroit, Michigan, U.S.A. (1920.)
260. Parker, Professor C. S., Department of Botany, Howard University, Washington, D.C., U.S.A. (1932.)
261. Parker, Mr Theo., The Cooper Field Research Laboratories, Wateringbury, Kent. (1931.)
262. Paul, Mr W. R. C., M.Sc., D.I.C., F.L.S., Department of Agriculture, Gampaha, Ceylon. (1928.)
263. Paulson, Mr Robert, F.L.S., F.R.M.S., Glenroy, Cecil Park, Pinner, Middlesex. (1918.)
264. Peacock, Dr H. G., The Lawn, Torquay. (1896.)

265. Pearson, Mr Arthur A., F.L.S., 59, Southwark Street, London, S.E. 1. (1911.)
266. Peklo, Dr Jaroslav, Professor of Applied Botany, Bohemian Technical University, Charles Square, Prague II, Czechoslovakia. (1924.)
267. Perthshire Society of Natural Science, c/o Mr James Winter (Hon. Treasurer), 35, George Street, Perth. (1919.)
268. Petch, Mr T., B.A., B.Sc., North Wootton, King's Lynn, Norfolk. (1911.)
269. Pethybridge, Mr G. H., Ph.D., B.Sc., F.L.S., Ministry of Agriculture, Pathological Laboratory, Milton Road, Harpenden, Herts. (1919.)
270. Peyronel, Dr Benjamino, R. Istituto Sup. Agrario e Forestale, Piazzale del Re, Firenze, Italy. (1932.)
271. Philadelphia, The Academy of Natural Sciences of Philadelphia, Logan Square, Phil., U.S.A. (1925.)
272. Phillips, Dr H. H., 6, St John's Road, Penge, London, S.E. 10. (1923.)
273. Ping, Mr A. Wentworth, M.A., "St Olave's," Clifton, York. (1926.)
274. Plowright, Mr C. T. M., B.A., M.B., King Street, King's Lynn. (1901.)
275. Potter, Rev. M. C., Sc.D., M.A., F.L.S., Corley Croft, New Milton, Hants. (1896.)
276. Povah, Dr A. H., Park Naturalist, Yellowstone National Park, Yellowstone Park, Wyoming, U.S.A. (1924.)
277. Preston, Mr N. C., B.Sc., Harper Adams Agricultural College, Newport, Salop. (1920.)
278. Pretoria, South Africa, The Chief, Division of Botany (91403), Department of Agriculture. (1922.)
279. Priestley, Professor J. H., D.S.O., B.Sc., F.L.S., Botanical Department, The University, Leeds. (1912.)
280. Proefstation voor Thee, Departement van Landbouw, Buitenzorg, Java. (1926.)
281. Purdue University, Library, Agricultural Experiment Station, Lafayette, Ind., U.S.A. (1931.)
282. Pusa, Imperial Mycologist, Imperial Agricultural Research Institute, Pusa, Bihar, India. (1921.)
283. Ramsbottom, Mr J., O.B.E., M.A., F.L.S., British Museum (Nat. Hist.), Cromwell Road, South Kensington, London, S.W. 7. (1910.)
284. Ray, Miss Anne, Penarwyn, Gorran Haven, Gorran, Cornwall. (1929.)
285. Rayner, Dr M. Cheveley (Mrs Neilson Jones), Bedford College for Women, Regent's Park, London, N.W. 1. (1921.)

286. Rea, Miss M. W., M.Sc., Salem House, Sydenham, Belfast, Northern Ireland. (1920.)
287. Rees, Mr John, M.Sc., Adviser in Agricultural Botany, University College, Cardiff. (1929.)
288. Reichert, Dr Israel, Jewish Agency for Palestine, Agricultural Experiment Station, P.O.B. 15, Rehoboth, Palestine. (1924.)
289. Rhind, Mr Donald, B.Sc., Economic Botanist, Department of Agriculture, Agricultural College, Mandalay, Burma. (1922.)
290. Rhodes, Miss Mabel, Lister Institute, Chelsea Gardens, London, S.W. 1. (1921.)
291. Rhodes, Rev. P. G. M., D.D., M.A. (Cantab.), F.L.S., St Mary's, Evesham, Worcestershire. (1929.)
292. Robson, Mr R., M.Sc., F.Z.S., East Hanningfield, Chelmsford, Essex. (1914.)
293. Roper, Miss Ida M., F.L.S., 4, Woodfield Road, Redland, Bristol. (1921.)
294. Rothamsted Experimental Station, Department of Mycology, Harpenden, Herts. (1923.)
295. Rutgers College and State University of New Jersey, Library, New Brunswick, New Jersey, U.S.A. (1922.)
296. St Paul, Minnesota, U.S.A., The Library, Department of Agriculture, University Farm. (1920.)
297. Salam, Mr M. M. Abdel-, Cotton Research Board, Giza, Egypt. (1930.)
298. Salisbury, Professor E. J., D.Sc., F.L.S., Botanical Department, University College, Gower Street, London, W.C. 1. (1921.)
299. Salmon, Professor E. S., F.L.S., South-Eastern Agricultural College, Wye, Kent. (1922.)
300. Sampson, Miss K., M.Sc., University College, Aberystwyth, North Wales. (1920.)
301. Samuel, Mr Geoffrey, The University of Adelaide, South Australia. (1923.)
302. Sanderson, Mr A. R., F.L.S., Austwick Hall, Austwick, Nr Lancaster. (1921.)
303. Sattar, Mr Abdus, B.Sc. (Agr.), Department of Plant Pathology, Imperial College of Science, South Kensington, London, S.W. 7. (1932.)
304. Scott, Mr W. W., 13, Bishop's Road, Highgate, London, N. 6. (1922.)
305. Searle, Mr G. Odell, B.Sc. (Agric.), Research Botanist, Linen Industry Research Association, Glenmore House, Lambeg, Lisburn, Northern Ireland. (1920.)
306. Seth, Mr N. L., B.Sc., Ph.D., D.I.C., Agricultural College, Mandalay, Burma. (1930.)

307. Sharpe, Mr C. J., Brambleside, Manor Road, Sidcup. (1905.)
308. Sharples, Mr A., A.R.C.S., D.I.C., Mycologist, Department of Agriculture, Kuala Lumpur, Federated Malay States. (1924.)
309. Shaw, Mr F. J. F., D.Sc., A.R.C.S., F.L.S., Imperial Agricultural Research Institute, Pusa, Bihar, India. (1920.)
310. Shear, Dr C. L., U.S. Department of Agriculture, Bureau of Plant Industry, Washington, D.C., U.S.A. (1930.)
311. Small, Mr W., M.B.E., M.A., Ph.D., B.Sc., Director, Department of Agriculture, Zomba, Nyasaland. (1915.)
312. Smart, Miss V., 69, High Street, Littlehampton, Sussex. (1929.)
313. Smith, Mr Alexander, M.A., Ph.D., Ministry of Agriculture, Pathological Laboratory, Milton Road, Harpenden, Herts. (1924.)
314. Smith, Miss K. E., The Quarry, Lutterworth Road, Nuneaton. (1913.)
315. Smith, Professor Noel J. G., Ph.D., B.Sc., Botany Department, Rhodes University College, Grahamstown, S. Africa. (1924.)
316. Smith, Mr Rupert, 38, Greenhill Gardens, Edinburgh. (1927.)
317. South London Botanical Institute, 323, Norwood Road, Tulse Hill, London, S.E. 24. (1921.)
318. Stakman, Professor E. C., University of Minnesota, Department of Agriculture, University Farm, St Paul, Minn., U.S.A. (1922.)
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320. Stationery Office, H.M., Superintendent of Publications, Book Dept., Westminster, S.W. 1. (4 subscriptions.) (1920.)
321. Stephens, Miss E. L., B.A., Department of Botany, University of Cape Town, Cape Town, South Africa. (1928.)
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323. Steyaert, M. R. L., Mycologiste de la Colonie, Stanleyville, Congo Belge. (1931.)
324. Stirrup, Mr H. H., M.Sc., Midland Agricultural College, Sutton Bonington, Loughborough. (1922.)
325. Storey, Mr H. H., M.A., Ph.D., East African Agricultural Research Institute, Amani, Tanganyika Territory, East Africa. (1922.)
326. Sutherland, Mr G. K., M.A., D.Sc., F.L.S., "Bremhill," 21, Combe Park, Bath, Somerset. (1914.)

327. Swansea Field Naturalists' Society, c/o Mr E. R. Brown, 71, Rhyddings Park Road, Swansea, South Wales. (1924.)
328. Swanton, Mr E. W., A.L.S., Educational Museum, Haslemere, Surrey. (1899.)
329. Swedish Academy of Sciences, Royal, Stockholm, Sweden. (1919.)
330. Sydney, Australia, The Librarian, University of. (1922.)
331. Sydow, Herr H., Luitpoldstrasse 33, Berlin, W. 30, Germany. (1931.)
332. Tabor, Mr R. J., B.Sc., F.L.S., Botanical Department, Imperial College of Science, South Kensington, London, S.W. 7. (1914.)
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335. Telfer, Mr R. Allsop, 7, Christchurch Road, Worcester. (1931.)
336. Tennessee, University of, Agricultural Experiment Station, Library, Knoxville, Tennessee, U.S.A. (1926.)
337. Tetley, Miss U., Leyfield, Kirkby Lonsdale, Westmorland. (1929.)
338. Tomkins, Mr R. G., M.A., Ph.D., Trinity College, Cambridge. (1925.)
339. United States Department of Agriculture, c/o Wheldon and Wesley, 2–4 Arthur Street, New Oxford Street, London, W.C. 2. (1907.)
340. Vanterpool, Mr T. C., M.Sc., Botanical Department, University of Saskatchewan, Saskatoon, Canada. (1929.)
341. Vasudeva, Mr R. S., Cotton Pathologist, Agricultural College, Lyallpur, Punjab, India. (1929.)
342. Wadham, Professor S. M., M.A., Department of Agriculture, The University, Melbourne, Victoria, Australia. (1922.)
343. Wakefield, Miss E. M., M.A., F.L.S., Herbarium, Royal Botanic Gardens, Kew. (1911.)
344. Waldie, Mr J. S. L., B.Sc., C.D.A., Department of Agricultural Botany, The University, Reading. (1925.)
345. Wales, University College of, Librarian, Botanical Department, Aberystwyth, North Wales. (1927.)
346. Wallace, Mr G. B., B.Sc. (Agric.), Ph.D., Department of Agriculture, Morogoro, Tanganyika Territory, East Africa. (1928.)
347. Wallace, Mrs G. B., B.Sc., Morogoro, Tanganyika Territory, East Africa. (1924.)
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349. Ware, Mr W. M., M.Sc., South-Eastern Agricultural College, Wye, Kent. (1924.)
350. Washington, Library, State College of Washington, Pullman, Wash., U.S.A. (1924.)
351. Watson, Mr W., D.Sc., A.L.S., Taunton School, Taunton. (1923.)
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358. Wilkins, Mr W. H., M.A., Department of Botany, The University, Oxford. (1928.)
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361. Wilson, Miss A. P., M.B.E., A.R.C.S., 116, Fellows Road, London, N.W. 3. (1929.)
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363. Wiltshire, Mr S. P., M.A., Imperial Mycological Institute, Ferry Lane, Kew, Surrey. (1920.)
364. Wisconsin, The Library, University of, Madison, Wis., U.S.A. (1923.)
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366. Woodcock, Mr A. J. A., M.Sc., F.E.S., Rhianva, 65, Rock Avenue, Gillingham, Kent. (1926.)
367. Woodward, Mr R. C., Ph.D., School of Rural Economy, Oxford. (1924.)
368. Woolhope, The Naturalists' Field Club, Hereford. (1896.)
369. Worcestershire Naturalists' Field Club, c/o Mr W. J. Else, Victoria Institute, Worcester. (1921.)
370. Wormald, Mr H., D.Sc., A.R.C.S., Research Station, East Malling, Kent. (1921.)
371. Wright, Mr E. Barton, M.Sc., Scottish Society for Research in Plant Breeding, Craig's House, Corstorphine, Midlothian. (1926.)

372. Yale University, Library, New Haven, Connecticut, U.S.A. (1930.)
373. Young, Miss Elaine M., Ph.D., M.Sc., University of the Witwatersrand, Johannesburg, South Africa. (1927.)
374. Zundel, Dr G. L. I., Botany Building, Pennsylvania State College, State College, Pa., U.S.A. (1929.)
375. Zürich, Switzerland, Botanical Garden and Museum, c/o Dr A. U. Däniker. (1921.)

RULES

Society's Name and Objects

1. The Society shall be called "The British Mycological Society," and its object shall be the study of Mycology in all its branches.

Members of Society

2. The Society shall consist of Honorary Members, Foundation Members and Ordinary Members; the number of Honorary Members shall be limited to 20, and that of Foundation Members to 100, but the number of Ordinary Members shall be unlimited.

Honorary Members

3. Honorary Members shall be persons of pre-eminence in Mycology, or who have rendered special service to the Society.

Foundation Members

4. Foundation Members shall be those Members or Societies who joined the Society previous to the limit of 100 Members having been attained.*

Officers

5. The Officers of the Society shall consist of a President, one or more Vice-Presidents, Treasurer, Secretaries, and Editor or Editors. They shall be elected annually, at the Annual General Meeting of the Society.

Government of Society

6. The government of the Society shall be vested in a Council, which shall consist of the President and other Officers for the time being, together with two or more other Members who shall be elected annually at the General Meeting, and one-half of whom shall retire each year and not be eligible for immediate re-election. The Members to retire shall be those who have been longest in office or, in case of equality, shall be determined by ballot. Ex-Presidents are *ex-officio* Members of the Council.

Every Meeting of the Council shall be duly summoned by the Hon. Secretary by at least seven days' notice in writing to each Member of the Council.

Period of Office

7. The Officers and Council shall hold office as from the 1st of January following their election.

* The limit of 100 Foundation Members was reached 22nd October, 1903.

Plant Pathology Committee

8. The special interests of Plant Pathology shall be delegated to an executive committee, to be called the Plant Pathology Committee of the British Mycological Society. This Committee shall consist of the President and Secretaries *ex-officio* and twelve other members of the Society. The latter shall be elected annually at the Annual General Meeting of the Society, and one-quarter shall retire in rotation each year and shall not be eligible for immediate re-election. The members to retire shall be those who have been longest in office, or, in case of equality, shall be determined by ballot.

The Officers shall consist of a Chairman and a Secretary, to be elected by the Committee each year.

At least two meetings shall be held every year, six members to form a quorum.

The Committee shall have power to appoint for any special purpose a sub-committee consisting either wholly or partly of members of the Committee.

Election of Members

9. Honorary Members shall only be elected at a Meeting of the Society by a majority of the Members then present.

All Ordinary Members shall be proposed and seconded respectively by existing Members, who shall sign a certificate (see Appendix) of recommendation, one at least of the proposers so certifying from personal knowledge. Every candidate for election shall sign an undertaking to abide by the Rules if elected (see Appendix). They shall be elected by a majority of the Members present at any meeting of the Society or by the President and Officers of the Society.

Subscription

10. All Ordinary Members and Societies shall pay an annual subscription of one pound, and Foundation Members five shillings, due on the 1st of January in each year. Honorary Members shall be exempt from any annual subscription.

Any Member wishing to retire from the Society shall give notice to the Hon. Secretary or Treasurer in writing before the 1st of December of the previous year.

Meetings

11. The Society shall hold one or more meetings annually, at a place and time determined by the Members at the preceding Annual General Meeting, or by the Council. The Annual General Meeting, for the election of officers and the transaction of other business, shall coincide with the Autumn Foray.

Accounts

12. At the Annual General Meeting of the Society in each year the Hon. Treasurer shall present duly audited accounts.

Alteration of Rules

13. The Rules shall not be altered except by a two-thirds majority of the Members present at an Annual General Meeting. A printed copy shall be sent to every Member of the Society on election, and in the event of alterations to all Members.

APPENDIX

Form of proposal for Ordinary Membership of the British Mycological Society

.....

of.....

.....

being desirous of becoming an Ordinary Member of the British Mycological Society, we, the undersigned Members of the Society, certify that we consider h to be a desirable Member of the Society, and beg to recommend h for election.

Dated this day of 19

..... (From personal knowledge.)

Certificate to be signed by the Candidate

I hereby certify that I desire to become an Ordinary Member of the British Mycological Society and that I will abide by the Rules if elected.

.....

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